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ABSTRACT

The Secretary's Commission on Achieving Necessary Skills (SCANS) examined the demands of the workplace and whether young people were capable of meeting those demands. Specifically, SCANS determined the level of skills required to enter employment. Fundamental changes in the nature of work were identified; these changes were found to hold implications for the kinds of workers and workplaces the nation must create. The research verified that "workplace know-how" defined effective job performance. This know-how had two elements: competencies and foundation skills. To describe how this know-how is used on the job, five scenarios were developed that portray work requirements in the context of the real world. The scenarios came from five sectors of the economy: manufacturing, health services, retail trade, accommodations and food service, and office services. They showed that work involved a complex interplay among five competencies (resources, interpersonal, information, systems, and technology) and three elements of the foundation (basic skills, thinking skills, and personal qualities). A proficiency scale with five levels was proposed: preparatory, work-ready, intermediate, advanced, and specialist. Three major conclusions were reached: (1) all U.S. high school students must develop the competencies and foundation skills; (2) the high performance qualities of the most competitive companies must become the standard for most companies; and (3) the nation's schools must become high performance organizations. (A letter to parents, employers, and educators and an executive summary are provided. Appendixes include definitions of the competencies and the foundation.) (YLB)

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WHAT WORK REQUIRES OF SCHOOLS

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A SCANS REPORT FOR AMERICA 2000

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THE SECRETARY'S COMMISSION ON ACHIEVING NECESSARY SKILLS
U.S. DEPARTMENT OF LABOR

WHAT WORK REQUIRES OF SCHOOLS

★ ★ ★ ★ ★

A SCANS REPORT FOR AMERICA 2000

THE SECRETARY'S COMMISSION ON ACHIEVING NECESSARY SKILLS
U.S. DEPARTMENT OF LABOR
JUNE 1991

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A LETTER TO PARENTS, EMPLOYERS, AND EDUCATORS

FROM THE SECRETARY OF LABOR AND THE SECRETARY'S COMMISSION ON ACHIEVING NECESSARY SKILLS

We, your Secretary of Labor and members of the Secretary's Commission on Achieving Necessary Skills (SCANS), write as concerned representatives of the nation's schools, businesses, unions, and government. We have completed our initial examination of changes in the world of work and the implications of those changes for learning.

We understand that schools do more than simply prepare people to make a living. They prepare people to live full lives—to participate in their communities, to raise families, and to enjoy the leisure that is the fruit of their labor. A solid education is its own reward.

This report concerns only one part of that education, the part that involves how schools prepare young people for work. It does not deal with other, equally important, concerns that are also the proper responsibility of our educators. We do not want to be misinterpreted. We are not calling for a narrow work-focused education. Our future demands more.

For most of this century, as this nation took its goods and know-how to the world, America did not have to worry about competition from abroad. At home, the technology of mass production emphasized discipline to the assembly line. Today, the demands on business and workers are different. Firms must meet world class standards and so must workers. Employers seek adaptability and the ability to learn and work in teams.

This change has many implications. We focus on one: more than half of our young people leave school without the knowledge or foundation required to find and hold a good job. Unless all of us work to turn this situation around, these young people, and those who employ them, will pay a very high price. Low skills lead to low wages and low profits. Many of these youth will never be able to earn a decent living. And, in the long run, this will damage severely the quality of life everyone hopes to enjoy. None of us, and none of you, wants to stand by while this happens.

The Commission spent 12 months talking to business owners, to public employers, to the people who manage employees daily, to union officials, and to workers on the line and at their desks. We have talked to them in their stores, shops, government offices, and manufacturing facilities. Their message to us was the same across the country and in every kind of job: good jobs depend on people who can put knowledge to work. New workers must be creative and responsible problem solvers and have the skills and attitudes on which employers can build. Traditional jobs are changing and new jobs are created everyday. High paying but unskilled jobs are disappearing. Employers and employees share the belief that all workplaces must "work smarter."

From these conversations, we have drawn three major conclusions:

All American high school students must develop a new set of competencies and foundation skills if they are to enjoy a productive, full, and satisfying life. Whether they go next to work, apprenticeship, the armed services, or college, all young Americans should leave high school with the know-how they need to make their way in the world. In this document, know-how has two parts: competence and a foundation of skills and personal qualities. Less than one-half of our young people possess it. This know-how will be important to those who will be developing the World Class Standards for educational performance called for by President Bush in April 1991 when he announced a new education strategy, "AMERICA 2000."

The qualities of high performance that today characterize our most competitive companies must become the standard for the vast majority of our companies, large and small, local and global. By "high performance" we mean work settings relentlessly committed to excellence, product quality, and customer satisfaction. These goals are pursued by combining technology and people in new ways. Decisions must be made closer to the frontline and draw upon the abilities of workers to think creatively and solve problems. Above all, these goals depend on people—on managers committed to high performance and to the competence of their workforce and on responsible employees comfortable with technology and complex systems, skilled as members of teams, and with a passion for continuous learning.

The nation's schools must be transformed into high-performance organizations in their own right. Despite a decade of reform efforts, we can demonstrate little improvement in student achievement. We are failing to develop the full academic abilities of most students and utterly failing the majority of poor, disadvantaged, and minority youngsters. By transforming the nation's schools into high-performance organizations, we mean schools relentlessly committed to producing skilled graduates as the norm, not the exception. That, in fact, is the goal of President Bush's education strategy.

But, these convictions remain abstract issues unless you can understand them in the world of your child's education, your business needs, and the standards of your school. This document lays out what these convictions mean in practice, on the job and in the school. Most important, it defines what you must do to protect the future of your child, your business, and the health of American education.

This report identifies five competencies, which, in conjunction with a three-part foundation of skills and personal qualities, lie at the heart of job performance today. (See page vii.) These eight areas represent essential preparation for all students, both those going directly to work and those planning further education. All eight must be an integral part of every young person's school life.

Seldom does one of these eight components stand alone in job performance. They are highly integrated, and most tasks require workers to draw on several of them simultaneously. Take an example far removed from the everyday world of work most of us experience: the men and women whose work involved planning and executing Operation Desert Storm had to apply all of the

competencies to the problems before them. They did not categorize the problems encountered into five domains of competence and a three-part foundation. Instead, the officers solved problems by bringing their know-how to bear on the situation in the Middle East. The soldiers who executed the orders of the officers had to bring the same kinds of know-how to bear at their level.

On a different front, American manufacturing exports have surged since 1984, driven in part by radical improvements in quality, lower costs, and improved efficiency. Both of these situations demonstrate what hundreds of thousands of Americans can do with solid training. There is every reason to believe that similar success can be duplicated school-by-school, worker-by-worker, and manager-by-manager in the competitive environment that tests the United States today.

The SCANS skills defined in this document carry serious implications for parents, employers, and educators.

Parents must insist that their sons and daughters master this know-how and that their local schools teach it. Unless you do, your children are unlikely to earn a decent living. If your

WORKPLACE KNOW-HOW

The know-how identified by SCANS is made up of five competencies and a three-part foundation of skills and personal qualities that are needed for solid job performance. These include:

COMPETENCIES—effective workers can productively use:

- **Resources**—allocating time, money, materials, space, and staff;
- **Interpersonal Skills**—working on teams, teaching others, serving customers, leading, negotiating, and working well with people from culturally diverse backgrounds;
- **Information**—acquiring and evaluating data, organizing and maintaining files, interpreting and communicating, and using computers to process information;
- **Systems**—understanding social, organizational, and technological systems, monitoring and correcting performance, and designing or improving systems;
- **Technology**—selecting equipment and tools, applying technology to specific tasks, and maintaining and troubleshooting technologies.

THE FOUNDATION—competence requires:

- **Basic Skills**—reading, writing, arithmetic and mathematics, speaking, and listening;
- **Thinking Skills**—thinking creatively, making decisions, solving problems, seeing things in the mind's eye, knowing how to learn, and reasoning;
- **Personal Qualities**—individual responsibility, self-esteem, sociability, self-management, and integrity.

children cannot learn these skills by the time they leave high school, they face bleak prospects—dead-end work, interrupted only by periods of unemployment, with little chance to climb a career ladder.

Polls indicate that most Americans believe that schools, in general, need improvement. But they also believe the school their child attends is fine. Both conditions cannot be true at the same time. The larger national problem begins in each of our neighborhood schools.

You can do several things to improve American education. First, display the SCANS skills prominently in your home and discuss them, often, with your children. Make sure they understand what you expect. Second, take the list with you to your child's school and find out where and how the school is equipping your child with these skills. Organize a parents' meeting to discuss the SCANS findings and what your school is doing about them. Finally, make sure that your school superintendent and your school board know of your interest in these competencies and this foundation.

Employers must orient their business practices to hiring and developing this know-how in employees. If you do not develop a world class workforce, your business inevitably will be at risk. If, for example, only 60 percent of your employees have these skills, and 90 percent of Japanese and German workers possess them, you are wasting much more on rework, poor quality, and late deliveries than are your competitors.

Here is what you can do. First, reorganize your workplace into the high-performance environment of the future. Nine out of ten employers are operating on yesterday's workplace assumptions. Do not be one of them. Second, invest in your employees so that they can obtain the skills needed to succeed in this new environment. Third, tell educators clearly what you need and work with them to accomplish it. You know that students have to believe that you care about what they learn. Employers who value performance in high school when they make their hiring decisions provide students with the right signal: learning and earning are related activities.

Finally, use the materials the Department of Labor can provide to confirm that the SCANS skills accurately reflect your local workforce requirements. Having confirmed these skills, make sure your local school board never loses sight of them in its instructional planning. By doing so, you will support the President of the United States in his efforts to put World Class Standards—incorporating the SCANS vision—into American schools and workplaces.

Educators have to instill in students the perspective on results that the SCANS skills demand. If you do not, you will be failing your students and your community as they try to adjust to the next century. You, more than anyone, are responsible for helping our children develop the skills they need.

Here is how you can help. First, tell your students what the standards are—what is expected of them. Second, give them the benefit of a fair and firm assessment of where they stand and what they need to do. If they pass from grade to grade and receive diplomas without mastering these skills, they cannot make their

way in the world of work. Third, inject the competencies and the foundation we have defined into every nook and cranny of the school curriculum. Your most gifted students need this know-how, and so do those experiencing the greatest difficulties in the classroom. We are convinced that if students are taught the know-how in the context of relevant problems, you will find them more attentive, more interested—indeed, more teachable—because they will find the coursework challenging and relevant. Finally, ask for the materials the Department of Labor can make available to you. Use them with your colleagues and the local business community to have your students confirm that the SCANS skills represent real work in your home town.

We know that some schools are already transforming themselves. They serve as the inspiration for President Bush's recent proposals to build "a New Generation of American Schools." We know, too, that many teachers are accomplishing wonders against formidable odds, and that most would do the same if given the opportunity. We hope to encourage these developments so that all schools, for every student, can be transformed.

Above all, we know that many students work very hard. But many more do not because they do not believe the lessons they are learning are connected to the real world or that the diplomas they are earning will bring them a brighter future.

This report addresses one obstacle that stands in the way of that future. Employers have never clearly told educators what students need to know and be able to do in order to succeed. Those requirements, as this Commission sees them, are described in the following pages.

This document is our opening statement about the future of your children, your business, and your school. It provides a general description of what is required. We have created this first statement with the advice of experts, educators, employees, supervisors, and business and labor leaders from around the nation. Do not take our word for it. Our conclusions must be tested in your homes, schools, and places of business. Join us in this conversation and share your thoughts with us. Write, call, and visit the Department of Labor for more information and for the tools and materials that can help you test these ideas and propositions for yourself.

June 28, 1991

Lynn Martin
Secretary of Labor

William E. Brock
The Brock Group, SCANS Chairman

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Aguirre International

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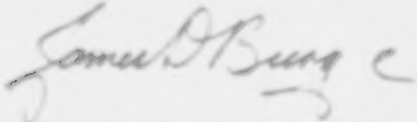

James D. Burge
Motorola, Inc.

Bruce Carswell
GTE Corporation

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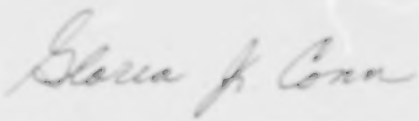
Greater Southeast Community Hospital

Paul F. Cole
New York State AFL/CIO



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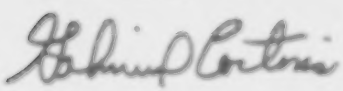
Wayne County Regional Educational
Service Agency



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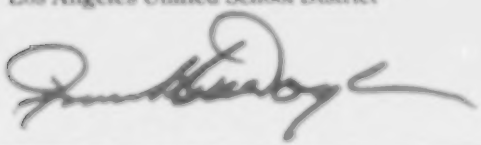
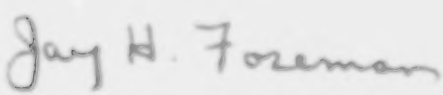
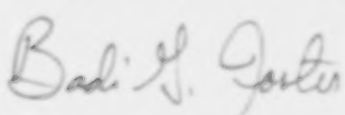
Los Angeles Unified School District



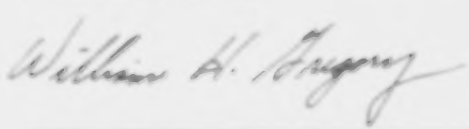
Frank P. Doyle
General Electric Company



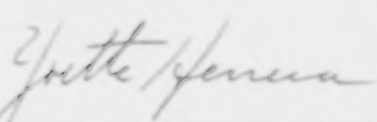
Jay H. Foreman
United Food and Commercial Workers



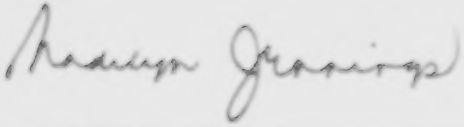
Badi G. Foster
Aetna Life and Casualty



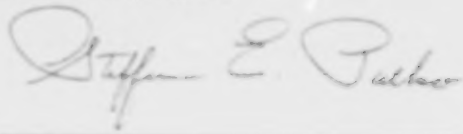
William H. Gregory
Gregory Forest Products



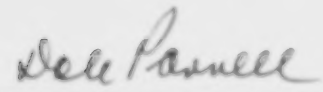
Yvette Herrera
Communications Workers of America



Madelyn P. Jennings
Gannett Company, Inc.



Steffen Palko
Cross Timber Oil Company



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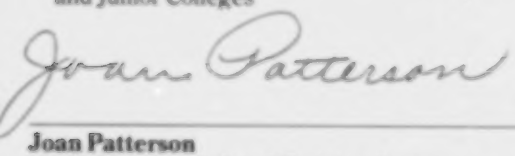

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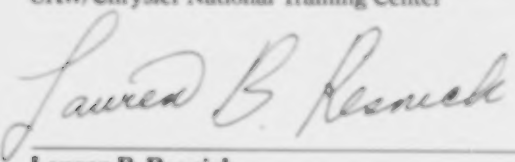

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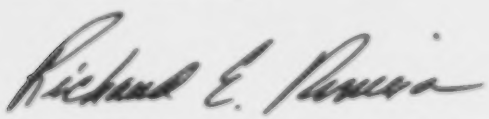

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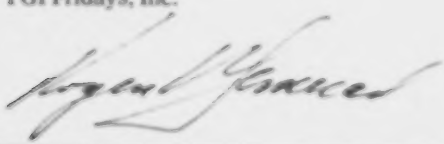
TGI Fridays, Inc.



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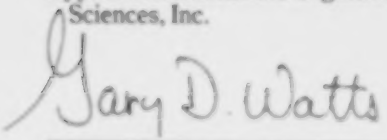

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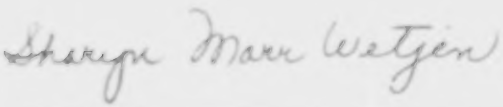

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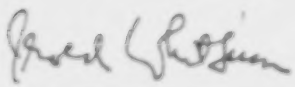

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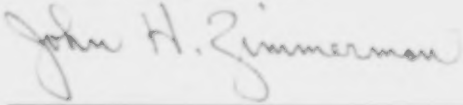

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U.S. Department of Labor
Secretary's Commission on Achieving Necessary Skills
SCANS
Washington, D.C. 20210

May 31, 1991

The Honorable Lynn Martin
Secretary of Labor
Washington, D.C.

Dear Madam Secretary:

The Secretary's Commission on Achieving Necessary Skills (SCANS) was asked to examine the demands of the workplace and whether our young people are capable of meeting those demands. Specifically, the Commission was directed to advise the Secretary on the level of skills required to enter employment.

It is my privilege to chair this effort. We began in May 1990 to engage businesses, schools, unions, and parents in a dialogue about the future they hold in common. On behalf of my colleagues on the Commission, I am pleased to transmit to you the results of our first year's work.

This document deals with two of our tasks—defining the skills needed and proposing acceptable levels of proficiency for them. A technical report expanding on the themes of this document will be provided later this year and a final report on our work will be available in February 1992.

Sincerely,

William E. Brock

William E. Brock
Chairman

EXECUTIVE SUMMARY

The Secretary's Commission on Achieving Necessary Skills (SCANS) was asked to examine the demands of the workplace and whether our young people are capable of meeting those demands.

Specifically, the Commission was directed to advise the Secretary on the level of skills required to enter employment. In carrying out this charge, the Commission was asked to:

- Define the skills needed for employment;
- Propose acceptable levels of proficiency;
- Suggest effective ways to assess proficiency; and
- Develop a dissemination strategy for the nation's schools, businesses, and homes.

This report results from our discussions and meetings with business owners, public employers, unions, and workers and supervisors in shops, plants, and stores. It builds on the work of six special panels we established to examine all manner of jobs from manufacturing to government employment. We also commissioned researchers to conduct lengthy interviews with workers in a wide range of jobs.

The message to us was universal: good jobs will increasingly depend on people who can put knowledge to work. What we found was disturbing: more than half our young people leave school without the knowledge or foundation required to find and hold a good job. These young people will pay a very high price. They face the bleak prospects of dead-end work interrupted only by periods of unemployment.

Two conditions that arose in the last quarter of the 20th Century have changed the terms for our young people's entry into the world of work: the globalization of commerce and industry and the explosive growth of technology on the job. These developments have barely been reflected in how we prepare young people for work or in how many of our workplaces are organized. Schools need to do a better job and so do employers. Students and workers must work smarter. Unless they do, neither our schools, our students, nor our businesses can prosper.

SCANS research verifies that what we call *workplace know-how* defines effective job performance today. This know-how has two elements: *competencies* and a *foundation*. This report identifies five competencies and a three-part foundation of skills and personal qualities that lie at the heart of job-performance. (See pages xvii and xviii.) These eight requirements are essential preparation for all students, both those going directly to work and those planning further education. Thus, the competencies and the foundation should be taught and understood in an integrated fashion that reflects the workplace *contexts* in which they are applied.

We believe, after examining the findings of cognitive science, that the most effective way of learning skills is "in context," placing learning objectives within a real environment rather than insisting that students first learn in the abstract what they will be expected to apply.

The five SCANS competencies span the chasm between school and the workplace. Because

they are needed in workplaces dedicated to excellence, they are hallmarks of today's expert worker. And they lie behind the quality of every product and service offered on today's market.

The competencies differ from a person's technical knowledge. For example, both accountants and engineers manage resources, information, systems, and technology. They require competence in these areas even though building a bridge has little to do with balancing a set of books. But in each profession, the competencies are at least as important as technical expertise. The members of the Commission believe these competencies are applicable from the shop floor to the executive suite. In the broadest sense, the competencies represent the attributes that today's high-performance employer seeks in tomorrow's employee.

To describe how this know-how is used on the job, our report provides a series of five scenarios that portray work requirements in the context of the real world. The scenarios show that work involves a complex interplay among the five competencies we have identified and the three elements of the foundation—the **basic skills,** higher order **thinking skills,** and diligent application of **personal qualities.**

The scenarios make clear that tomorrow's career ladders require even the basic skills—the old 3 Rs—to take on a new meaning. First, all employees will have to **read** well enough to understand and interpret diagrams, directories, correspondence, manuals, records, charts, graphs, tables, and specifications. Without the ability to read a diverse set of materials, workers cannot locate the descriptive and quantitative information needed to make decisions or to recommend courses of action. What do these reading requirements mean on the job? They might involve:

- interpreting blueprints and materials catalogues;
- dealing with letters and written policy on complaints;
- reading patients' medical records and medication instructions; and
- reading the text of technical manuals from equipment vendors.

At the same time, most jobs will call for **writing skills** to prepare correspondence, instructions, charts, graphs, and proposals, in order to make requests, explain, illustrate, and convince. On the job this might require:

- writing memoranda to justify resources or explain plans;
- preparing instructions for operating simple machines;
- developing a narrative to explain graphs or tables; and
- drafting suggested modifications in company procedures.

Mathematics and **computational skills** will also be essential. Virtually all employees will be required to maintain records, estimate results, use spreadsheets, or apply statistical process controls as they negotiate, identify trends, or suggest new courses of action. Most of us will not leave our mathematics behind us in school. Instead, we will find ourselves using it on the job, for example, to:

- reconcile differences between inventory and financial records;

FIVE COMPETENCIES

Resources: Identifies, organizes, plans, and allocates resources

A. *Time*—Selects goal-relevant activities, ranks them, allocates time, and prepares and follows schedules
B. *Money*—Uses or prepares budgets, makes forecasts, keeps records, and makes adjustments to meet objectives
C. *Material and Facilities*—Acquires, stores, allocates, and uses materials or space efficiently
D. *Human Resources*—Assesses skills and distributes work accordingly, evaluates performance and provides feedback

Interpersonal: Works with others

A. *Participates as Member of a Team*—contributes to group effort
B. *Teaches Others New Skills*
C. *Serves Clients/Customers*—works to satisfy customers' expectations
D. *Exercises Leadership*—communicates ideas to justify position, persuades and convinces others, responsibly challenges existing procedures and policies
E. *Negotiates*—works toward agreements involving exchange of resources, resolves divergent interests
F. *Works with Diversity*—works well with men and women from diverse backgrounds

Information: Acquires and uses information

A. *Acquires and Evaluates Information*
B. *Organizes and Maintains Information*
C. *Interprets and Communicates Information*
D. *Uses Computers to Process Information*

Systems: Understands complex inter-relationships

A. *Understands Systems*—knows how social, organizational, and technological systems work and operates effectively with them
B. *Monitors and Corrects Performance*—distinguishes trends, predicts impacts on system operations, diagnoses deviations in systems' performance and corrects malfunctions
C. *Improves or Designs Systems*—suggests modifications to existing systems and develops new or alternative systems to improve performance

Technology: Works with a variety of technologies

A. *Selects Technology*—chooses procedures, tools or equipment including computers and related technologies
B. *Applies Technology to Task*—Understands overall intent and proper procedures for setup and operation of equipment
C. *Maintains and Troubleshoots Equipment*—Prevents, identifies, or solves problems with equipment, including computers and other technologies

- estimate discounts on the spot while negotiating sales;
- use spreadsheet programs to monitor expenditures;
- employ statistical process control procedures to check quality; and
- project resource needs over the next planning period.

Finally, very few of us will work totally by ourselves. More and more, work involves listening carefully to clients and co-workers and clearly articulating one's own point of view. Today's

A THREE-PART FOUNDATION

Basic Skills: Reads, writes, performs arithmetic and mathematical operations, listens and speaks

A. *Reading*—locates, understands, and interprets written information in prose and in documents such as manuals, graphs, and schedules

B. *Writing*—communicates thoughts, ideas, information, and messages in writing; and creates documents such as letters, directions, manuals, reports, graphs, and flow charts

C. *Arithmetic/Mathematics*—performs basic computations and approaches practical problems by choosing appropriately from a variety of mathematical techniques

D. *Listening*—receives, attends to, interprets, and responds to verbal messages and other cues

E. *Speaking*—organizes ideas and communicates orally

Thinking Skills: Thinks creatively, makes decisions, solves problems, visualizes, knows how to learn, and reasons

A. *Creative Thinking*—generates new ideas

B. *Decision Making*—specifies goals and constraints, generates alternatives, considers risks, and evaluates and chooses best alternative

C. *Problem Solving*—recognizes problems and devises and implements plan of action

D. *Seeing Things in the Mind's Eye*—organizes, and processes symbols, pictures, graphs, objects, and other information

E. *Knowing How to Learn*—uses efficient learning techniques to acquire and apply new knowledge and skills

F. *Reasoning*—discovers a rule or principle underlying the relationship between two or more objects and applies it when solving a problem

Personal Qualities: Displays responsibility, self-esteem, sociability, self-management, and integrity and honesty

A. *Responsibility*—exerts a high level of effort and perseveres towards goal attainment

B. *Self-Esteem*—believes in own self-worth and maintains a positive view of self

C. *Sociability*—demonstrates understanding, friendliness, adaptability, empathy, and politeness in group settings

D. *Self-Management*—assesses self accurately, sets personal goals, monitors progress, and exhibits self-control

E. *Integrity/Honesty*—chooses ethical courses of action

worker has to **listen** and **speak** well enough to explain schedules and procedures, communicate with customers, work in teams, understand customer concerns, describe complex systems and procedures, probe for hidden meanings, teach others, and solve problems. On the job, these skills may translate readily into:

- training new workers or explaining new schedules to a work team;
- describing plans to supervisors or clients;
- questioning customers to diagnose malfunctions; and
- answering questions from customers about post-sales service.

SCANS estimates that less than half of all young adults have achieved these reading and writing minimums; even fewer can handle the mathematics; and, schools today only indirectly address listening and speaking skills.

Defining the minimum levels of proficiency in the SCANS competencies is also a crucial part of the Commission's task. It requires judgments about the learning possible in yet-to-be designed schools. It also requires imagining what the workplaces of the year 2000 could and should look like.

Our work on these required levels of proficiency is not complete. We have examined less than a third of the jobs we intend to research. We also wish to hear what others think of our initial efforts. The insert at the top of page xx is illustrative of our initial estimates of work-ready levels of proficiency in the five competencies. Proficiency in each competency requires proficiency in the foundation. The contexts displayed come from more extensive scenarios contained in our report. The point we wish to make is that young people leaving school should have both a sufficient foundation and level of understanding of the competencies to exhibit performances like those illustrated.

The minimums we propose will define what makes a young person ready for work at entry levels on career ladders. They represent neither the first nor last step in a process of life-long learning. Instead, the minimums will be a second step in a progression of skills acquisition. For example, consider scheduling time, part of the SCANS **resources** competency. A young student (at the preparatory stage) might be expected to make a schedule for him or herself. Being *work-ready* would require making a schedule for others. At the extreme, a specialist might develop schedules for an airline. (See insert at bottom of page xx.)

In September 1989 President Bush and the nation's governors agreed to six national goals in education to be achieved by the year 2000. By April 1991 a four-part strategy to attain these six goals was announced by President Bush and Secretary of Education Lamar Alexander. This report of the Secretary of Labor's Commission on Achieving Necessary Skills speaks directly to those goals and to that strategy. It defines what our young people must know and be able to do in order to hold a decent job and earn a decent living.

Our work pertains directly to National Goals #3 and #5 which state:

Goal #3 American students will leave grades four, eight, and twelve having demonstrated competency in challenging subject matter including English,

KNOW-HOW:
WORK-READY LEVEL OF PROFICIENCY

COMPETENCE	EXAMPLE OF LEVEL
RESOURCES	Develop cost estimates and write proposals to justify the expense of replacing kitchen equipment. Develop schedule for equipment delivery to avoid closing restaurant. Read construction blueprints and manufacturers' installation requirements to place and install equipment in the kitchen.*
INTERPERSONAL	Participate in team training and problem-solving session with multicultural staff of waiters and waitresses. Focus on upcoming Saturday night when local club has reserved restaurant after midnight for party. Three people cannot work and team has to address the staffing problem and prepare for handling possible complaints about prices, food quality, or service.*
INFORMATION	Analyze statistical control charts to monitor error rate. Develop, with other team members, a way to bring performance in production line up to that of best practice in competing plants.**
SYSTEMS	As part of information analysis above, analyze painting system and suggest how improvements can be made to minimize system downtime and improve paint finish.**
TECHNOLOGY	Evaluate three new paint spray guns from the point of view of costs, health and safety, and speed. Vendors describe performance with charts and written specifications. Call vendors' representatives to clarify claims and seek the names of others using their equipment. Call and interview references before preparing a report on the spray guns and making a presentation to management.**

PROGRESS IN ACQUIRING SKILLS

PROFICIENCY LEVEL	PERFORMANCE BENCHMARK
PREPARATORY	Scheduling oneself
WORK-READY	Scheduling small work team
INTERMEDIATE	Scheduling a production line or substantial construction project
ADVANCED	Developing roll-out schedule for new product or production plant
SPECIALIST	Develop algorithm for scheduling airline

*Competence as demonstrated in a service sector application.
**Competence as demonstrated in a manufacturing sector application.

mathematics, science, history, and geography; and every school in America will ensure that all students learn to use their minds well, so they may be prepared for responsible citizenship, further learning, and *productive employment in our modern economy.* (emphasis added)

Goal #5 Every adult American will be literate and will *possess the knowledge and skills necessary to compete in a global economy* and exercise the rights and responsibilities of citizenship. (emphasis added)

Our report is intended to contribute to all four parts of the strategy put forth by President Bush in AMERICA 2000 as shown below.

Workforce know-how will be part of the new World Class Standards. However, defining competencies and a foundation is not enough. Schools must teach them. Students must learn them. And, they should be assessed as part of the AMERICA 2000 agenda. Our work on these issues will continue over the coming months. Among the concrete steps SCANS will take in the future are efforts to:

- examine how to create an assessment system that helps students understand what they have to learn and certifies that they have mastered the competencies so that employers and colleges will honor their record of high school performance;
- consider the implications of the SCANS findings for curriculum development, school organization, teacher training, and instructional materials and technology; and
- help the Administration establish the public-private partnership called for in the education strategy, "AMERICA 2000."

The President of the United States has encouraged all of us to become revolutionaries in the cause of education. For over 200 years

EXCERPTS FROM AMERICA 2000's FOUR-PART STRATEGY[1]

Part 1.

"For Today's Students: Better and More Accountable Schools—World Class Standards: . . . . These standards will incorporate both knowledge and skills, to ensure that, when they leave school, young Americans are prepared for further study and the work force."

Part 2.

"For Tomorrow's Students: A New Generation of American Schools. New American Schools: help communities create schools that will reach the national education goals, including World Class Standards."

Part 3.

"For the Rest of Us (Yesterday's Students/Today's Work Force): A Nation of Students—Private-Sector Skills and Standards: Business and labor will be asked...to establish job-related skill standards, built around core proficiencies...."

Part 4.

"Communities Where Learning Can Happen." AMERICA 2000 Communities. The president is challenging every city, town, and neighborhood... to adopt the six national education goals... [and] develop a report card for measuring progress."

[1]The White House, April 18, 1991.

Americans have worked to make education part of their national vision, indispensable to democracy and to individual freedom. For at least the last 40 years, we have worked to further the ideal of equity—for minority Americans, for the disabled, and for immigrants. With that work still incomplete, we are called to still another revolution—to create an entire people trained to think and equipped with the know-how to make their knowledge productive.

This new revolution is no less exciting or challenging than those we have already completed. Nor is its outcome more certain. All that is certain is that we must begin.

I.
HIGH-PERFORMANCE WORK AND SCHOOLS

On April 18, 1991, when the President of the United States announced a new education strategy, "AMERICA 2000," he said, "Think about every problem, every challenge, we face. The solution to each starts with education. For the sake of the future of our children and the nation, we must transform America's schools. The days of the status quo are over."

We understand that schools do more than simply prepare people to make a living. They prepare people to live full lives—to participate in their communities, to raise families, to enjoy the leisure that is the fruit of their labor. A solid education is its own reward and has value beyond specific skills.

This report concerns one part of the transformation the President has described, the part that involves how our schools prepare our young people for work. It does not deal with other, equally important, concerns that are also the proper responsibility of our educators, such as providing comprehensive instruction in history, literature, geography, and theoretical science and mathematics so our young people can live the full lives we wish for them. Competency in these five core subjects remains relevant to the "real world." This report should not be misconstrued as suggesting that schools abandon these subjects in favor of workplace skills training.

This document describes fundamental changes in the nature of work, and the implications those changes hold for the kinds of workers and workplaces the nation must create. It defines "workplace know-how"—a quality that workers must possess if they are to grow, produce, and succeed. It is about changes in how we should think about the connections between education and earning a living. This report is about helping our youth enter the workforce prepared with the know-how they need to master whatever challenges work and life will place before them.

THE WORLD HAS CHANGED

A strong back, the willingness to work, and a high school diploma were once all that was needed to make a start in America. They are no longer. A well-developed mind, a passion to learn, and the ability to put knowledge to work are the new keys to the future of our young people, the success of our businesses, and the economic well-being of the nation.

Two events of the last generation serve as metaphors for how radically and irreversibly the economic environment for all work has changed, both for Americans and for the rest of the world. In 1973, the OPEC oil embargo made it unmistakably clear that our nation's economic future was no longer ours alone to decide. Since then, the lessons of globalization and interdependence have been reinforced at every turn. In many ways, 1973 was a boundary line defining new territory.

Two years later, the first plans for an unheard of new product—a personal computer—appeared in a popular scientific magazine. That device has altered both the speed with which work is done and its very nature. It has reconfigured the world of work as have perhaps no other inventions since electricity or the assembly line. It has created not only a new industry; it has redefined the way thousands of different kinds of work are now carried out.

Globalization and technology contain both threat and promise. The threat is easily summarized in the economic implications of energy dependence, disappointing productivity growth, and stagnant wages. For example:

- **Productivity.** Productivity growth (output per hour) in the United States slowed significantly after 1973. Labor productivity actually declined in 1989 and 1990. Some estimate that if current international productivity trends continue, nine countries may exceed the U.S. in output per worker-hour by the year 2020.
- **Earnings and Income.** Stagnant productivity has seriously affected workers' earnings. Median family income increased nearly three percent a year between 1947 and 1973. Since 1973, it has scarcely increased at all. Families with heads of households under the age of 34 have watched their real income decline since 1979.
- **Jobs.** Job opportunities in the United States are changing. Twenty years ago, manufacturing accounted for 27 percent of all nonagricultural employment in the U.S.; services and retail trade for 32 percent. By 1990, manufacturing accounted for only 17 percent of these jobs, while services and retail trade made up 44 percent. In 1990, manufacturing jobs paid an average of $10.84 per hour; while service jobs paid $9.86 and jobs in retail trade paid only $6.78.

But the promise of an internationalized economic environment and a workplace grounded in new technologies is equally dramatic. The promise is a healthy economy that improves the standard of living for all by growing—by increasing productivity, creating new jobs, and meeting the challenges placed before it.

WORK IS CHANGING

To paraphrase futurist Alvin Toffler, we are now caught up in a "third wave" of industrialization. Just as the United States powered its early industrial growth with steam and built a manufacturing empire on the assembly line, it can now catch the crest of computer technology to create a high-wage, high-skill future.

That future depends on high-performance work organizations and a highly competent workforce. It will be as different from our present as today's most advanced work and workplace are different from Henry Ford's assembly line. As a corporate member of the commission observed, in reviewing preliminary descriptions of the workplace developed during this project, "What startles me about these descriptions is the realization that they are accurate, but ten years ago I could not possibly have imagined them. What concerns me is this lack of imagination. What will our workplace look like ten years from today?"

Figure A on the following page, adapted from a chart developed by the Congressional Office of Technology Assessment, summarizes the major differences between the traditional workplace and the leading-edge, high-performance work-

places that are beginning to develop. These differences were also found by the MIT Commission on Industrial Productivity that reported in 1989. The members of SCANS believe these new workplaces should become the norm, not the exception.

In most workplaces of today, work is routinized, repetitive, and organized along hierarchical lines. Perhaps its most prominent feature is that it emphasizes mass production by workers who are not asked to think about what they are doing. It leaves quality to be inspected into the product after-the-fact, i.e., by weeding out defects through a separate quality control process.

High performance workplaces, by contrast, stand as a model for a successful future. In this new environment, work is problem-oriented, flexible, and organized in teams; labor is not a cost but an investment. Most important, the high-performance organization recognizes that producing a defective product costs more than producing a high-quality one. The solution: design quality into the product development proc-

FIGURE A

CHARACTERISTICS OF TODAY'S AND TOMORROW'S WORKPLACE[1]

TRADITIONAL MODEL	HIGH PERFORMANCE MODEL
STRATEGY	
• mass production	• flexible production
• long production runs	• customized production
• centralized control	• decentralized control
PRODUCTION	
• fixed automation	• flexible automation
• end-of-line quality control	• on-line quality control
• fragmentation of tasks	• work teams, multi-skilled workers
• authority vested in supervisor	• authority delegated to worker
HIRING AND HUMAN RESOURCES	
• labor-management confrontation	• labor-management cooperation
• minimal qualifications accepted	• screening for basic skills abilities
• workers as a cost	• workforce as an investment
JOB LADDERS	
• internal labor market	• limited internal labor market
• advancement by seniority	• advancement by certified skills
TRAINING	
• minimal for production workers	• training sessions for everyone
• specialized for craft workers	• broader skills sought

[1]Source: "Competing in the New International Economy." Washington. Office of Technology Assessment, 1990.

ess itself, particularly by enabling workers to make on-the-spot decisions.

Workplaces organized along the lines of the traditional mass production model can no longer prosper. Like the dinosaur with its limited intelligence, doomed to extinction at the hands of smaller but craftier animals, the traditional model cannot survive the competition from high-performance organizations that depend on the intelligence and ingenuity of their managers and employees. High-performance organizations are relentlessly committed to excellence, to product quality, and to customer service. These are the organizations that have revived American manufacturing competitiveness and compete for the nation's mark of business distinction—the Department of Commerce's Baldrige Award. One of the defining characteristics of these firms is a workforce with the skills outlined in this document.

THE EDUCATIONAL SIDE OF THE EQUATION

The world has changed. Work is changing. But despite their best efforts, most schools have not changed fast enough or moved far enough. For nearly a decade, education reform and its relationship to America's place in the world have been high on the public's agenda. Reports have been developed, meetings convened, and announcements and calls to arms issued. Literally hundreds of specific recommendations have been put forward by researchers, public leaders, opinion molders, and school officials.

Many educators have responded. Most communities in the United States have felt the impact: new curricula, adult literacy efforts, compensatory programs, in-school child care, new teacher training efforts—all of these and more have been tried. Yet, despite some promising exceptions, we are unable to demonstrate that things are, on the whole, much better. In terms of achieving results, not much has changed despite great effort and significant increases in funding.

It is time to ask: Why is that so? How is it that all this time, energy, and effort have been expended to so little avail? The problem is complex and so are the answers. Part of the difficulty is that employers and school personnel are passing each other like ships in the night: one speaks in Morse code, the other signals with flags. As a consequence of the miscommunication, secondary school students often see little connection between what they do in school and how they expect to make a living. They, therefore, invest very little effort in their education. The average American high school junior puts in half of the 60 hours a week that a Japanese peer devotes to schoolwork.

Miscommunication

One reason for the lack of educational improvement lies in the confusing signals exchanged between the education and the business communities. The educator asks, "What do you want in our graduates? We are confident we can produce it." The response is, too frequently, a set of contradictory cues.

- The local tour bus operator responds, "I want graduates who can diagnose and repair diesel engines and who know something about air brakes. That's my first priority. I don't have time to train these kids."
- The local bank vice president says, "I want clean and attractively dressed young people, with a solid grasp of the basics—reading, writing, and computation—and we will teach them the banking business."

- The owner of a small manufacturing firm asks for dependable, reliable graduates who will show up on time with enough technological skill to immediately step into the CAD-CAM (Computer-Assisted Design and Computer-Assisted Manufacturing) operation.

Researchers' efforts have proven equally unhelpful. Most attempts to characterize work skills focus either on general human characteristics (e.g., intelligence, reasoning ability, reaction time) or on the characteristics of specific jobs (e.g., ability to assemble items or route packages). The level of detail communicated varies from the very general (ability to solve problems) to the very specific (perform a tack weld on sheet metal). As a result, the operational implications and meaning of these lists are frequently difficult to determine. They do not provide direct links to the "stuff" of schools or a sense of the work enabled by the skills identified.

Frustrated, the school finds that the business world has not defined what schools should be doing. To the extent that individual business leaders are clear, they often convey an unrealistic expectation that schools serve as their firm's training institution with their specific training requirements at the front of the line.

The results are predictable. Despite sincere, well-intentioned efforts to respond, the schools—lacking clear and consistent guidance—continue with the system and methodologies they inherited from a system designed nearly 100 years ago for the needs of business organizations that are now quite different.

The Student

The disjointed conversation between the schools and employers creates a situation in which students understand intuitively, often correctly, that what they are doing in school today bears little resemblance to what they will be expected to do in the workplace tomorrow. Many students, both those expecting to go to work immediately after 12th grade and those going to most colleges, simply do not consider high school work as worth serious effort.

The sense that students clearly distinguish between what goes on in their classrooms and what goes on in the "real world" was palpable in focus groups convened as part of the SCANS research. Not one of the students in these groups believe that a high school diploma by itself guarantees a job in today's economy. All of them, in fact—whether bound for college or work—believe that job skills, by and large, are learned on the job, by hands-on experience, through extracurricular activities, or by osmosis. In other words, they believe that the skills needed in the real world are, in the words of one student, just "picked up."

But the massive training budgets of today's corporations are powerful evidence that workforce know-how cannot be simply "picked up." When students fail to associate "school" work with "real" work, they draw the wrong conclusion—that "school" work is not "real." In fact, however, the task of learning is the real work of today, whether at school, in the university, on the job, or in the White House. It is this task young people must master in every environment.

THE CHALLENGE

The challenge this situation places before the nation's business and educational communities is three-fold. The first task is to develop a better means of communicating, a common vocabulary to guide the conversation between

the business and school communities. The following chapter suggests such a vocabulary. The second task is to set clear-cut standards and then convince students that effort invested in meeting these standards today will be rewarded in the world of work tomorrow. A major part of this task involves persuading students, teachers, parents, and business leaders that workplace know-how is not something "you just pick up." It can be defined. It should be taught. It must be learned. The third task is to assess and certify students' workplace readiness so that students, their parents, and employers will know where they stand.

II.
WHAT IS WORK LIKE TODAY?

In arguing that today's employers have been inconsistent and contradictory in their messages to the schools, we have pointed out that different employers have different needs—that the manufacturing plant differs from the machine shop and that neither bears much relationship to the typical office environment. All of that is true. But the diversity is largely a fog obscuring what is, in fact, a set of common competencies and skills shared by all workers. SCANS understands these competencies and skills as "workplace know-how."

FIVE SCENARIOS

This chapter explores that know-how. It does so, first, by examining the world of work through five short "scenarios" describing what high school graduates are actually expected to do when they enter high-performance work environments. We go on to draw from these scenarios the competencies and skills that will define effective work performance for the year 2000.

The five scenarios come from the following sectors of the economy:

- Manufacturing;
- Health Services;
- Retail Trade;
- Accommodations and Food Services; and
- Office Services.

We recognize that not all workplaces in these sectors are currently organized to draw upon the skills displayed by the workers in the scenarios. But we believe that the increasingly competitive environment businesses face is forcing more of them to reorganize to make better use of more highly-skilled workers. This means that those students who leave school prepared to enter such workplaces will get the best jobs with the most stable and rewarding futures. The student who leaves school with the workplace know-how described in these scenarios will be the prepared worker America requires in the next century.

Manufacturing

Kareem is an electronics specialist working as an electrician in a newly designed "Big Three" automobile assembly plant (AAP) in the Midwest. He had previously spent two years in the Army as an electronics specialist. The plant is a state-of-the-art production facility employing 2,900 hourly workers. About two years ago, assembly line automation was completed with the selection and installation of a new robotics painting system. Kareem was involved in the selection of this equipment, which Alice, the procurement specialist in the engineering department chose with advice from line workers. But a pressing issue developed on the operating line: how to train people to properly use, maintain, and troubleshoot the system.

The vendor for the painting system had provided initial training in the system's programmable logic. But, after the vendor left, Kareem found himself frequently on-call to troubleshoot the problems of the new system because the other shop electricians were not able to maintain it. The other electricians, who had been

hired from an older AAP plant on the basis of seniority, were what are called "pipe, wire, and relay" electricians who had a difficult time making the transition to electronics concepts. It appeared that while the vendor had provided solid training in generalized troubleshooting, they had not provided sufficient training in how to troubleshoot the system as integrated into an automotive plant.

Kareem worked with the head of high-technology training at AAP and the vendor to revise the training to emphasize a broad array of maintenance skills needed on the line. The goal, in part, was to reduce the costs associated with repeated calls for assistance from the vendor.

The coursework, which was taught by Kareem, included a review of basic electrical theory and training in basic electronics concepts. It also included work in pneumatics and hydraulics. It heavily emphasized the use of computer consoles with on-the-floor simulations of equipment operation.

One result of this ongoing training is a more confident team of electricians who can provide immediate assistance to the line. Another is equally impressive: system downtime (which can cost automakers more than $1 million daily) has been reduced by 22 percent at AAP.

Health Services

Luretta is the registrar in the emergency room of City Hospital, a large public facility on the West Coast serving a diverse, urban population. She is the first person patients meet when they enter the hospital. Stress in the emergency room is almost tangible, particularly on weekends. Residents of nearby low-income neighborhoods use the facility for routine health care; accident victims from all over the area are frequently brought to City; and gang violence produces many severely wounded patients. This combination threatens to overwhelm the emergency room on weekends.

On Friday evening, the emergency room staff is just recovering from a very difficult afternoon. Seven children, injured when their school bus was hit by a delivery van, were brought to the emergency room between 3:30 and 4:00 p.m. As Luretta takes a breather, an ambulance crew brings in a local college student suffering from a drug overdose. Luretta processes his papers from information provided by the ambulance crew and turns him over to a Licensed Practical Nurse (LPN). As the LPN leaves, a gunshot victim staggers in on the arm of a friend. Luretta grabs the friend to get information on the victim and has an orderly wheel the victim back to an examining room. At that very moment, a distraught mother arrives with her teenage daughter who is wheezing, clearly in severe respiratory distress.

Confident that the first two patients are in good hands, Luretta turns her attention to the mother and daughter only to find that neither speaks English. The girl is choking; the mother, unable to make herself understood, becomes hysterical. Frank, a Registered Nurse (RN) who hears the commotion, arrives and takes the girl to an examining room. As the RN leaves he instructs Luretta to get an attending physician and an interpreter.

Luretta locates Dr. Paula Jones in the next room and asks her to come to the examining room. Next, she calls the Community Affairs

office and gets an interpreter on the phone with the mother and herself. The interpreter informs Luretta that the girl is asthmatic and that she has been treated at the hospital before. Luretta smiles at the mother to reassure her that everything is under control and goes to her computer terminal to locate the daughter's hospital records. Luretta hands a copy of the records to Dr. Jones who completes the examination of the girl and prescribes medication to relieve her distress.

Retail Trade

Mickey is a salesperson at a computer store on Main Street in a small northeastern city. The store carries a basic line of computers and printers from five different manufacturers, about 15 pieces of equipment in all, varying in size, price, and capabilities. The store also carries a wide range of software, from word processing to database management programs, as well as paper, diskettes, add-on peripherals such as modems, and miscellaneous supplies.

This week the company has a sale on laptop computers. Moreover, each member of the sales force who sells 10 or more laptops will receive one free for his or her own use. Mickey goes to the database he maintains on his computer to search his customer records for promising purchasers. He first lists owners of laptops from the same manufacturer, then owners of other laptops, and begins placing calls.

At this point, a customer walks into the store. The customer owns a seven-person real estate company. She complains that her salespeople travel so much throughout the region that they cannot stay on top of mortgage rates from different banks or new listings throughout the state. As a result they are losing sales. Mickey responds, "You've come to the right place. Portable computers—laptops—can solve this problem for you. And, we have a terrific sale on them right now."

"This model has a built-in modem. If you equip your cars with phones, your employees could download all the information they need just by dialing your office from the car. You also need a desktop computer at your office to answer the phone, but your salespeople could connect with it directly; or, we have a software package called Real Estate Monitor which hooks you up directly to an on-line information service that has up-to-the-minute real estate listings and mortgage rates."

The customer is intrigued, but worried about the costs. Mickey nods, "Even with the sale we are offering, seven or eight computers is a substantial investment for a small firm. But let me ask you this. You tell me you are losing two or more sales a week because your sales force can't stay on top of listings and mortgage rates. If this system helps you recoup just one of those sales a week, isn't it true that it will pay for itself in a month or two?"

"That may be about right," responds the customer. "My name is Joan Lewis. Let's sit down and talk about precisely how much this is going to cost me."

Accommodations and Food Services

Greg, Anthony, and Kathleen are on the verge of realizing an entrepreneurial dream—opening their own restaurant (The Three Chefs) in a growing southern town. Independently they have worked hard to reach this point, spending

10 or more years learning the restaurant business, pooling their savings, and borrowing from friends and family to raise the start-up capital they needed. Greg took out a second mortgage on his home to satisfy the local bank's demand for security on a line of credit.

Greg serves as manager and "front-of-the-house" shift supervisor during the day. Kathleen is the lunchtime chef and evening manager. Anthony trains the staff, does the bookkeeping, and prepares the evening meals. Renovation has been completed on the restaurant, and most of the new kitchen equipment has been installed. Waiters and waitresses have completed their training and have worked two practice shifts to iron out problems.

Kathleen and Anthony analyzed the "back-of-the-house" work flow during the practice shifts and developed a plan for improving the kitchen's output. They can improve efficiency in the kitchen by almost 20 percent by starting food preparation an hour early and moving one of the work stations to the front of the house. After some discussion, the three of them realized that although the repositioning makes sense, it will probably cost them between $7,000 and $10,000, which they do not have. If their projections are correct, they might be able to afford it after they have made about $250,000 in sales, i.e., in three to four months, if all goes well. They opt to make minor adjustments to the system and refrain from expensive changes until they have seen how the first month's sales and expenses look.

"Here's another way we can control our costs," says Kathleen. "I've come across a new management information system that can generate inventory reports, sales reports, and pricing charts. We can integrate the inventory reports and pricing data to project costs and make menu changes. I've also been looking at several different accounting software packages. I think the software our accountant recommended is the most suitable for our needs. There is a large pool of programmers who know that software, making it easier for us to obtain a consultant on short notice to tailor it to our operation."

Office Services

Verbatim Transcription Service (VTS) provides written records of meetings, legal proceedings, and conferences. The firm employs 24 people, including six transcribers, but today only four of the transcribers are available. The transcriber's job is to decipher tapes received from stenographers and recorders and create a written record. Accuracy and timeliness are critical elements of the transcriber's work which undergirds the firm's success.

Gabriela is a top-notch transcriber at VTS. This has been a particularly busy week, and today she has six tapes in various stages of conversion. Three of the clients have asked for their documentation by the following morning. One law firm has a court case approaching. The minutes of a controversial school board budget hearing are to be delivered to the local newspaper tomorrow for publication the following day and the president of a local university (one of VTS's largest clients) wants immediate service on the tapes of a book she is dictating, regardless of how many other clients are inconvenienced.

Gabriela doesn't think she can finish all the tapes on time and goes to Nan, her supervisor, to discuss the problem and possible solutions. She and Nan decide to call in a freelance transcriber

they have hired previously to work with legal clients. Gabriela then calls the school board president and the local newspaper. She arranges to have the minutes reviewed that evening by school board staff so that she can make corrections and deliver them to the newspaper by the editor's "drop-dead" deadline. She is able to reach the university president with whom she discusses her time constraints and negotiates a reprieve. Gabriela works out a schedule whereby she will have the president's transcript ready two days later by 4:00 p.m.

After finishing her scheduled daily work, Gabriela looks over the first draft of a new transcriber hired to work exclusively with a local teaching hospital to determine if his knowledge of medical terms is adequate. Otherwise, he will be sent to a specialized training course. Gabriela tells Nan that, in her opinion, they have hired the right person and no further training is needed.

COMMON ELEMENTS: FIVE COMPETENCIES

The benefit of these scenarios is that they begin to do justice to the rich complexity—the problems, demands, rewards and satisfactions—of high-performance work. They capture what some men and women face and actually do in today's workplace. They confirm that when employers say they want people comfortable with technology and capable of solving problems, they are realistic. They confirm, too, that reading, writing, and basic arithmetic are not enough. These skills must be integrated with other kinds of competency to make them fully operational. But these scenarios range from the effort to make a sale to the work of saving lives in hospital emergency rooms. What do they have in common? Are there competencies that are generic to the entire economy?

The common elements in each of the scenarios are exceptional performance in five competencies. (See Figure B.) These five competencies rest on a three-part foundation of skills and personal qualities that we will address later. The competencies span the chasm between the worlds of the school and the workplace. They are the basis of the modern workplace dedicated to excellence. They are the hallmark of today's expert worker. And they lie behind every product and service offered on today's market—putting food on tables, travellers in rooms, airplane passengers at their destination, patients in the operating room, and automobiles on the street.

The expert worker of tomorrow will not simply "pick-up" these competencies. Their acquisition must begin in the schools and be refined through on-the-job experience and further training. Teaching and learning the competencies must become the tasks of our schools and students.

In each scenario, competent workers demonstrate their skill in managing or using:

1. **Resources.** Workers schedule time, budget funds, arrange space, or assign staff.
2. **Interpersonal Skills.** Competent employees are skilled team members and teachers of new workers; they serve clients directly and persuade co-workers either individually or in groups; they negotiate with others to solve problems or reach decisions; they work comfortably with colleagues from diverse backgrounds; and they responsibly challenge existing procedures and policies.

FIGURE B

FIVE COMPETENCIES[2]

Resources: Identifies, organizes, plans, and allocates resources

A. *Time*—Selects goal-relevant activities, ranks them, allocates time, and prepares and follows schedules
B. *Money*—Uses or prepares budgets, makes forecasts, keeps records, and makes adjustments to meet objectives
C. *Material and Facilities*—Acquires, stores, allocates, and uses materials or space efficiently
D. *Human Resources*—Assesses skills and distributes work accordingly, evaluates performance and provides feedback

Interpersonal: Works with others

A. *Participates as Member of a Team*—contributes to group effort
B. *Teaches Others New Skills*
C. *Serves Clients/Customers*—works to satisfy customers' expectations
D. *Exercises Leadership*—communicates ideas to justify position, persuades and convinces others, responsibly challenges existing procedures and policies
E. *Negotiates*—works toward agreements involving exchange of resources, resolves divergent interests
F. *Works with Diversity*—works well with men and women from diverse backgrounds

Information: Acquires and uses information

A. *Acquires and Evaluates Information*
B. *Organizes and Maintains Information*
C. *Interprets and Communicates Information*
D. *Uses Computers to Process Information*

Systems: Understands complex inter-relationships

A. *Understands Systems*—knows how social, organizational, and technological systems work and operates effectively with them
B. *Monitors and Corrects Performance*—distinguishes trends, predicts impacts on system operations, diagnoses deviations in systems' performance and corrects malfunctions
C. *Improves or Designs Systems*—suggests modifications to existing systems and develops new or alternative systems to improve performance

Technology: Works with a variety of technologies

A. *Selects Technology*—chooses procedures, tools or equipment including computers and related technologies
B. *Applies Technology to Task*—Understands overall intent and proper procedures for setup and operation of equipment
C. *Maintains and Troubleshoots Equipment*—Prevents, identifies, or solves problems with equipment, including computers and other technologies

[2]More complete definitions can be found in Appendix B.

3. **Information.** Workers are expected to identify, assimilate, and integrate information from diverse sources; they prepare, maintain, and interpret quantitative and qualitative records; they convert information from one form to another and are comfortable conveying information, orally and in writing, as the need arises.
4. **Systems.** Workers should understand their own work in the context of the work of those around them; they understand how parts of systems are connected, anticipate consequences, and monitor and correct their own performance; they can identify trends and anomalies in system performance, integrate multiple displays of data, and link symbols (e.g., displays on a computer screen) with real phenomena (e.g., machine performance).
5. **Technology.** Technology today is everywhere, demanding high levels of competence in selecting and using appropriate technology, visualizing operations, using technology to monitor tasks, and maintaining and troubleshooting complex equipment.

The competencies differ from a person's technical knowledge. For example, both accountants and engineers manage resources, information, systems, and technology. They require competence in these areas even though building a bridge has little to do with balancing a set of books. But in each profession, the competencies are at least as important as technical expertise.

The members of SCANS believe these competencies are applicable from the shop floor to the executive suite. They are generic; all are needed across industries and at many steps on a career ladder. (See page 14.) In the broadest sense, the competencies represent the attributes employers seek in today's and tomorrow's employee.

Returning to the scenarios, we can see clearly how essential these five competencies are for effective performance across the job spectrum.

Resources

Whether it was Kareem in the automobile factory, Kathleen and her partners in the restaurant, or Gabriela at VTS, all demonstrated their ability to manage resources. Kareem understood that time is a resource and that downtime costs money. The entrepreneurial chefs had put their life savings on the line and their analyses of costs, procedures, and the best use of their own time were designed to protect that investment. Gabriela made exceptional use of the human resources and time available to her in meeting a time crunch with serious implications for VTS's reputation.

Interpersonal

Interpersonal competence is the lubricant of the workplace, minimizing friction and the daily wear and tear of work. It also undergirds restructured work organizations in factories and provides the "service" in service firms. It is required if teams are to solve problems that they jointly face. All of these competent workers function effectively in quite complicated interpersonal environments. A false step in most of these situations invites resistance from colleagues or clients and could, in some situations, threaten lives.

Far from looking down his nose at the traditional "pipe, wire, and relay" electricians, Kareem understood that manufacturing quality products is a team effort. He needed his experience as an electrician with AAP to develop effective training programs to make the most of the plant's state-of-the-art equipment. Gabriela's skills helped her

COMPETENCE NEEDED ACROSS THE BOARD

Who needs the SCANS competencies? Everyone from the entry-level clerk to managers, executives, or partners in professional corporations. Take the high-pressure world of a major law firm as an example of how competence is required across the board:

Receptionists are expected to demonstrate personable "front-desk" skills (meeting clients and identifying their needs) and to manage complex telecommunications systems without difficulty.

Secretaries are routinely called on to work with associates and partners with different, often difficult, working styles and to manipulate computer-based data, graphics, and information systems on different kinds of equipment.

Legal Administrators help select and oversee the installation of state-of-the-art telecommunications and information systems to meet lawyers' needs and they also ensure that all support personnel are trained in these systems.

Associates (junior attorneys) having spent three years learning the rudiments of the legal system and its precedents stretching back to common law, are now expected to put that knowledge to work on specialized problems situated in complex modern systems, e.g., corporations, hospitals, contracts, or civil rights law, and to search for precedents supporting the client's legal position.

The Managing Partner is responsible for ensuring that the cogs and gears of the entire firm operate as a harmonious system—that the support system meets the demands the firm places on it; that the accounting and finance systems follow and recover costs; that the background of the lawyers meshes with the legal specialty of the firm; and that potentially profitable new areas of client interest can be accommodated.

negotiate a potentially troubling work conflict. Mickey took his customer's concern about costs seriously, but turned the issue to his advantage. Luretta, in perhaps the most pressure driven of these situations, went out of her way to reassure the distraught mother, while seeking help in two directions simultaneously, from a doctor and an interpreter.

Information

Luretta, staring at a potentially life-threatening situation, could do nothing to help until she obtained the information needed by the doctors. Calmly, in the face of this stress, she called in an interpreter and, armed with the knowledge of the patient's history and the location of her records, expertly manipulated a computerized information system to locate the records that City Hospital doctors had to have. Gabriela's job at VTS is essentially transforming information from one form (audio tapes or stenographic notes) to another, a written record.

The heart of Mickey's job is not so much selling as showing his customers how the equipment he has to offer can solve their information problems. If he can do that, the technology sells itself. In the scenario Mickey solicited information from the customer about the customer's information needs. Using that knowledge, he was able to describe how laptops, modems, telephones, and specialized software could make information an asset in the world of real estate, instead of a problem.

Systems

As the world of work has become more complex, all workers have been required to understand their own work in the context of that of others. They must think of discrete tasks as part of a coherent whole. Greg, Kathleen, and Anthony understood that the "front-of-the-house" could not begin to function without an effective operation in the "back-of-the-house." Moreover, they correctly viewed portions, menus, and inventory control not as discrete problems, but as integral parts of the restaurant's cost structure, susceptible to a single cost-control system.

On one level, Kareem's troubleshooting of the computerized painting equipment is simply part of his job. Kareem's special contribution was to understand that his job affected the entire operation and the profitability of the plant. He then drew on the engineering department, his co-workers with outdated skills, the training department, and the strengths of the vendor.

Luretta's job as registrar placed her in a pivotal position for the systems revolving around her—ambulance crews, nursing staff, physicians, orderlies, the police, and community affairs specialists. Luretta might easily have satisfied herself with jotting down the information the interpreter gave her, leaving Dr. Jones to worry about obtaining the patient's records. She did not. Dr. Jones did not have to. And the patient received immediate attention.

Technology

Nobody today can avoid technology; it has penetrated every aspect of life from the home to the job. Those unable to use it face a lifetime of menial work. Mickey obviously spends his working life fitting technologies to his client's needs. But he also uses the technology himself to stay in contact with his customers. Kareem worked with the engineering department to select and install the new robot painting system. His knowledge of the electronics of this new technology propelled him from the ranks of the electricians, first to troubleshooter, and then to a leadership position in the new training effort. At the heart of the inventory and cost control efforts of the three chefs, we find a technology-based information system which will make or break their restaurant.

THE FOUNDATION

What of the employer's other significant requests of the schools, that they provide students with the basic skills of reading, writing, and computation or that they teach punctuality and responsibility? Are these traditional functions of American schools now outdated, overwhelmed by the new demands of the workplace? On the contrary, SCANS research has identified a three-part foundation of intellectual skills and personal qualities that are part of each of the five competencies. (See Figure C.)

The foundation includes three parts:

- **Basic Skills.** Reading, writing, mathematics (arithmetical computation and mathematical reasoning), listening, and speaking;
- **Thinking Skills.** Creative thinking, making decisions, solving problems, seeing things in the mind's eye, knowing how to learn, and reasoning; and
- **Personal Qualities.** Individual responsibility as well as self-esteem, sociability, self-management, and integrity.

The scenarios are a useful device for exploring how the foundation both contributes to excellent performance and serves as a floor under the

FIGURE C

A THREE-PART FOUNDATION[3]

Basic Skills: Reads, writes, performs arithmetic and mathematical operations, listens, and speaks

A. *Reading*—locates, understands, and interprets written information in prose and in documents such as manuals, graphs, and schedules

B. *Writing*—communicates thoughts, ideas, information, and messages in writing; and creates documents such as letters, directions, manuals, reports, graphs, and flow charts

C. *Arithmetic/Mathematics*—performs basic computations and approaches practical problems by choosing appropriately from a variety of mathematical techniques

D. *Listening*—receives, attends to, interprets, and responds to verbal messages and other cues

E. *Speaking*—organizes ideas and communicates orally

Thinking Skills: Thinks creatively, makes decisions, solves problems, visualizes, knows how to learn and reasons

A. *Creative Thinking*—generates new ideas

B. *Decision Making*—specifies goals and constraints, generates alternatives, considers risks, and evaluates and chooses best alternative

C. *Problem Solving*—recognizes problems and devises and implements plan of action

D. *Seeing Things in the Mind's Eye*—organizes, and processes symbols, pictures, graphs, objects and other information

E. *Knowing How to Learn*—uses efficient learning techniques to acquire and apply new knowledge and skills

F. *Reasoning*—discovers a rule or principle underlying the relationship between two or more objects and applies it in solving a problem

Personal Qualities: Displays responsibility, self-esteem, sociability, self-management, and integrity and honesty

A. *Responsibility*—exerts a high level of effort and perseveres towards goal attainment

B. *Self-Esteem*—believes in own self-worth and maintains a positive view of self

C. *Sociability*—demonstrates understanding, friendliness, adaptability, empathy, and politeness in group settings

D. *Self-Management*—assesses self accurately, sets personal goals, monitors progress, and exhibits self-control

E. *Integrity/Honesty*—chooses ethical courses of action

[3]More complete definitions can be found in Appendix C.

five competencies. The competent performance described in the scenarios would have been impossible without sufficient proficiency in both the basic and thinking skills, as well as responsible personal behavior.

The basic skills are the irreducible minimum for anyone who wants to get ever, a low-skill job. They will not guarantee a career or access to a college education, but their absence will ensure that the door of opportunity remains closed. The thinking skills, by contrast, permit workers to analyze, synthesize, and evaluate complexity. They are the true raw materials from which the five competencies are built because they make workers the masters of their work instead of its servants.

The personal qualities are attributes that employers would like to be able to take for granted, but cannot. They are so important that their absence can quickly disqualify any job seeker at any level of accomplishment. Schools normally do not "teach" these qualities in the classroom itself but weave them into the life and structure of the school environment—in the expectations that the school holds for student behavior and in the consequences it exacts if those expectations are not met.

Effective performance in today's workplace absolutely requires high levels of performance in all three parts of the foundation. There is no point in belaboring the obvious. People who cannot read, write, and communicate cannot be trusted in a transcription service. The rude salesman who alienates customers will not make sales. The cashier with a hand in the till cheats the business and ultimately the customers. The electrician who cannot solve technical problems threatens the production line. And restaurant owners who cannot creatively approach problems will probably not be in business for long.

The foundation is far too often viewed as the most we can hope for from a public education. In fact, it is the point from which real competence is built. If the foundation is all we can hope for, that is all we will get, and we will have settled for far too little. The term "foundation" means just that. It supports the possibilities and potentials that most of our young people sense in themselves, and that schools must bring out. By learning the competencies as they learn the foundations, each intertwined with the other, our young people will be ready to enter and thrive in the workplace of tomorrow.

III.
IMPLICATIONS FOR LEARNING

The SCANS goal is increased educational achievement for all segments of the population. We intend to transform perceptions about the preparation essential for work. If all of tomorrow's students are to master the full repertoire of SCANS competencies and their foundation, schools must change. The know-how we have defined is also important for further learning beyond high school. If yesterday's students, that is, today's workers— are to acquire these competencies—then workplaces must also be restructured and so must the adult education providers that serve them.

Students will not acquire what they need to progress in life by osmosis, either in school or in the workplace. Learning through experience is okay only if all students and workers are exposed to the right experiences. The SCANS skills can be taught. Schools and workplaces must provide structured opportunity for their acquisition.

TODAY'S SCHOOLS

Today's schools must determine new standards, curricula, teaching methods, and materials. Although SCANS believes that a total reorientation is required, with foresight and planning the know-how we have defined can be incorporated in the five core subjects (history, geography, science, English, and mathematics) as well as in other subjects and the extracurricular activity of schools.

SCANS believes that teachers and schools must begin early to help students see the relationships between what they study and its applications in real-world contexts. It is not true that everything we need to know in life we learned in kindergarten; it is true, however, that we can begin that early to learn what life requires.

We believe, after examining the findings of cognitive science, that the most effective way of teaching skills is "in context." Placing learning objectives within real environments is better than insisting that students first learn in the abstract what they will then be expected to apply. SCANS suggests three principles from cognitive science to guide real contextual learning in all our schools:

- Students do not need to learn basic skills before they learn problem-solving skills. The two go together. They are not sequential but mutually reinforcing;
- Learning should be reoriented away from mere mastery of information and toward encouraging students to recognize and solve problems; and
- Real know-how—foundation and competencies—cannot be taught in isolation; students need practice in the application of these skills.

The foundation is best learned in the context of the competencies that it supports. Reading and mathematics become less abstract and more concrete when they are embedded in one or more of the competencies; that is, when the learning is "situated" in a systems or a technological problem. When skills are taught in the context of the competencies, students will learn the skill more rapidly and will be more likely to

apply it in real situations. Personal characteristics such as self-esteem and responsibility, to use another example, are best developed in teamwork efforts. Choosing between teaching the foundation and the competencies is false; students usually become more proficient faster if they learn both simultaneously. In sum, learning in order "to know" must never be separated from learning in order "to do." Knowledge and its uses belong together. (See Figure D.)

Finally, in the Commission's view, the foundation skills should be assessed along with competencies. Deficiencies in basic or thinking skills will be found in the performance of the competencies. These deficiencies need to be pointed out to the student and immediately remedied. But if students can demonstrate the competency properly, they can be assumed to have the foundation they need.

AMERICA 2000 calls for radically improving all 110,000 of today's schools, making them better and more accountable. The SCANS competencies are our contribution to that effort.

THE SCHOOL OF TOMORROW

Just as our workplaces are being reshaped, so too are our schools. As others have said, the school of tomorrow can be as different from today as overnight delivery is from the pony express. On May 22, 1991, President Bush sent Congress the AMERICA 2000 Excellence in Education Act. The bill included the *New American Schools* program for starting "break-the-mold schools." The first wave will create 535 such entities and more are anticipated by the year 2000. Students in these new schools will be learning the SCANS skills in new ways.

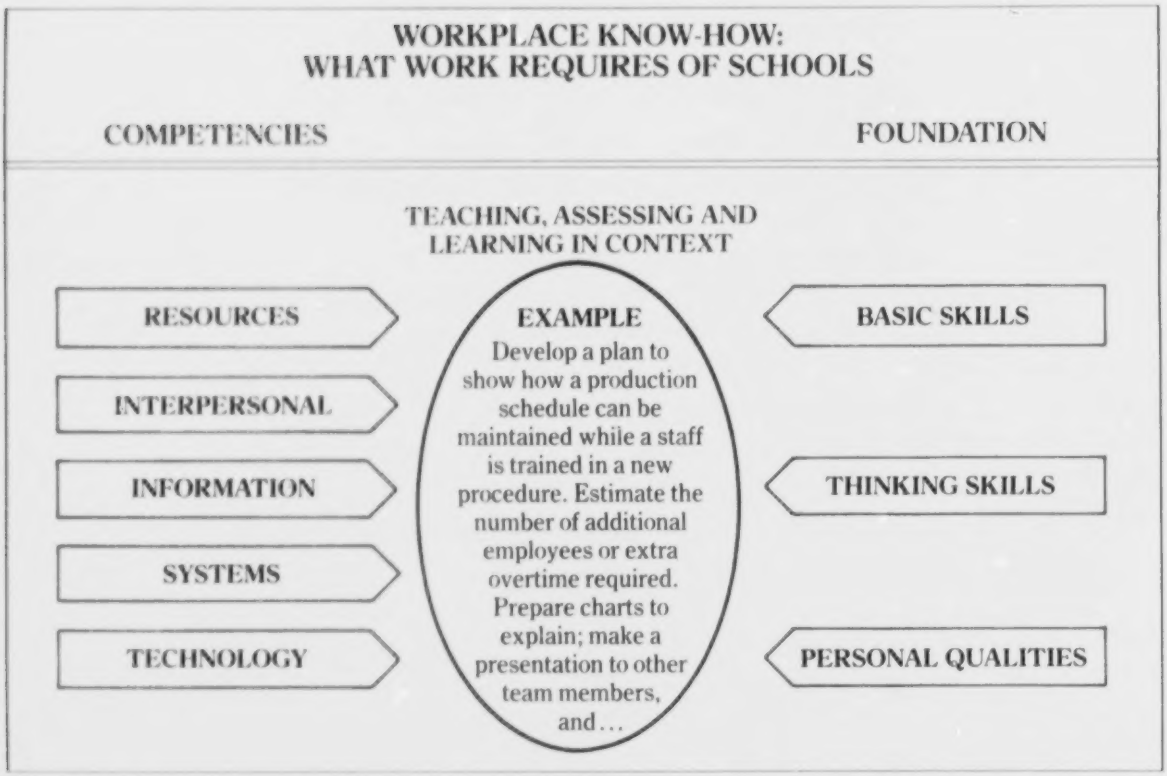
Imagine the challenge to education at the turn of the century in AMERICA 2000. School and work have been restructured and both are far more productive than they are today. (See Figure E.) Students of all ages learn more per hour in schools of all sorts and workers earn more per hour on the job.

The emphasis on quality means fewer dropouts from schools and fewer rejects on the production line. Our children are internationally competitive in math and science and, partly as a result, so are American goods and services.

In junior and senior high schools, all students are studying the five core subjects defined by President Bush: English, mathematics, science, history, and geography. They are regularly assessed in these subjects by means of formal, nationally-comparable assessments made in the 4th, 8th, and 12th grades. Proficiency in the SCANS competencies is determined from the assessment for grades 8 and 12.

The 8th grade SCANS assessment is a benchmark for each student. It tells where more effort is needed if the student is to aspire to a decent job or to higher education. Daily, less formal assessments are guiding teacher and student alike. Learning a musical instrument is a sound analogy—the formal assessment is a recital, but the daily assessment comes in practice. Response is instantaneous and continual at each rehearsal. The SCANS competencies are tested in the same way—formal assessments at grades 8 and 12, but daily reinforcement occurs in curriculum activities centered on team efforts, school projects, and diaries, notebooks, and records of experiments maintained in each student's portfolio.

FIGURE D


WORKPLACE KNOW-HOW:
WHAT WORK REQUIRES OF SCHOOLS
COMPETENCIES
FOUNDATION
TEACHING, ASSESSING AND
LEARNING IN CONTEXT
RESOURCES
INTERPERSONAL
INFORMATION
SYSTEMS
TECHNOLOGY
EXAMPLE
Develop a plan to show how a production schedule can be maintained while a staff is trained in a new procedure. Estimate the number of additional employees or extra overtime required. Prepare charts to explain; make a presentation to other team members, and...
BASIC SKILLS
THINKING SKILLS
PERSONAL QUALITIES

Assessments of student competency in the 12th grade are taken into consideration by college admissions officials. But there is a new development: employers are also paying attention to assessments of the SCANS skills in their hiring and placement decisions.

Moreover, all students are able to acquire the assessed skills with study. Indeed, the portions of the assessments related to the know-how defined by SCANS are publicly available, so teachers can teach the SCANS skills, and students can understand what they must learn. This is not curriculum driven by multiple choice tests; it is assessment to guide learning. High-performance firms build in quality; they do not test it in at the end of the production line. The schools of the future will, in a similar way, integrate assessment and instruction.

The SCANS competencies and skills are not intended for special tracks labeled "general" or "career" or "vocational" education. All teachers, in all disciplines, are expected to incorporate them into their classwork. The challenge here is to teach the know-how that young people need as an essential element of learning across the curriculum, including the five core subjects. Students will find the content more relevant and challenging. Teachers will find their classes more

FIGURE E

CHARACTERISTICS OF TODAY'S AND TOMORROW'S SCHOOLS

SCHOOLS OF TODAY	SCHOOLS OF TOMORROW
STRATEGY	
• Focus on development of basic skills	• Focus on development of thinking skills
• Testing separate from teaching	• Assessment integral to teaching
LEARNING ENVIRONMENT	
• Recitation and recall from short-term memory	• Students actively construct knowledge for themselves
• Students work as individuals	• Cooperative problem solving
• Hierarchically sequenced—basics before higher order	• Skills learned in context of real problems
MANAGEMENT	
• Supervision by administration	• Learner-centered, teacher directed
OUTCOME	
• Only some students learn to think	• All students learn to think

attentive and interested. Employers and college officials will be delighted with the results because the curriculum will be tied to real things in the real world.

The know-how defined by SCANS should be the responsibility of teachers in every curricular and extra-curricular area. These skills can and should be developed in the five core courses, in art and music, in foreign languages, in vocational education, on the school newspaper, or on athletic teams. Take the five core subject areas as examples (and these are only examples, as SCANS will not be prescribing curricula):

- **Allocating resources** can be taught in almost any of the five core subjects. Space and material resources are a natural object of inquiry in both history and geography. In both, students can study how the environment and natural resources shaped tribes and nations. Budgets—from simple addition, to percentages, to algebra imbedded in sophisticated spreadsheets—can be covered in mathematics. Learning how to compute percentages in the context of a realistic budget problem will be much more profitable than if taught in the abstract or with artificial word problems.
- **Systems** and **technology** have a natural home in science courses. Students might learn about computer networks—or electrical or hydraulic or ecological systems—and be asked to evaluate alternative equipment possibilities in laboratory experiments. At higher levels of mathematics, students

might learn statistical process control techniques as part of competence with systems.

- **Social systems** and **information** can again be taken up in history and geography. Students could be asked to compare the colonial "system" to the representational system that emerged from the Constitutional Convention.
- **Basic skills** find a natural home in English classes—reading, writing, listening, and speaking. What may not be as obvious are the possibilities for covering competence in information as well. Communications skills and the use of the computer for word-processing, graphics, multi-media (video and audio), and manipulating databases can all be taught in the context of solving relevant problems.
- **Interpersonal** competence can be covered in all five core subjects, using cooperative learning opportunities to encourage teamwork and evaluation of the team's solutions. Teachers might, at the beginning of the term, tell students that they will have the opportunity to teach. Students would understand that their grade, in part, depends on how well their classmates learn the material they teach.

Future SCANS reports will discuss further the relationship between the SCANS competencies and achievements in the five core subjects. Clearly, the idea is that as students advance they will become more proficient in each of the SCANS five competencies. Performance in the 12th grade should be far superior to performance in the 8th. Performance after postsecondary school, training in the armed services, an apprenticeship program, or workplace-based training should be at a higher level still. SCANS believes that all students should be able to demonstrate their mastery of these skills by the time they can legally leave high school, age 16 in most states.

YESTERDAY'S STUDENT/ TODAY'S WORKER

Most of those graduating high school this June, or in previous years, have not had an opportunity to learn the SCANS competencies. Four of every five of those who will be earning their living in the year 2000 are already beyond high school age. Yet, all these workers need to understand systems, allocate resources, and so on.

Fortunately, learning opportunities do not end with high school graduation. And these opportunities will have to be increased if Goal #5 of the six National Goals, agreed to by President Bush and the governors, is to be achieved. That goal states in part:

> *"Every adult American will be literate and will possess the knowledge and skills necessary to compete in a global economy...."*

Meeting the goal means that programs that serve workers must teach the SCANS know-how. They need to be part of the curriculum goals for programs offered by companies at the workplace. They should also be present where unions and companies jointly participate—as the United Auto Workers does with the auto firms, and the Communication Workers of America and the International Brotherhood of Electrical Workers do with AT&T.

The SCANS proficiencies should also be sought by workers whose firms do not provide them with training or who are looking for work and are served by adult education and training programs including those administered by the Department of Labor under the Job Training Partnership Act or the Department of Health and Human Services under the Family Assistance Act.

AMERICA 2000 seeks to transform the United States from a "Nation at Risk" to a "Nation of Students." The strategy would change life-long learning from a slogan to a reality for all. Responsibility for the transformation must be assumed by all sectors of society, including employers. Neither presidents nor parents will be heeded for long if employers do not value and reward additional skills. Figure A in Chapter I listed the characteristics of high-performance employers. These include investment in workers and promotion for skills attained. It makes no sense for schools to teach self-management if employers want to vest all authority in supervisors. Speaking skills will atrophy if workers are only expected to listen. Traditional mass production factories often viewed creativity as a liability rather than as an asset in a worker; and they certainly did not need workers who could "challenge existing procedures." Understanding systems yields no advantage if tasks are fragmented. Knowing how to schedule is an unnecessary skill if workers are subject to the routine of the traditional production lines.

In short, most employers have to require and be able to use productively the SCANS competencies. Otherwise, schools, students, and workers will not put forth the effort needed. In the words of an earlier Commission, America will have to choose a high-skilled, high-wage future. Workplaces must reorganize to use SCANS skills and become a learning environment for them. This choice will have to be made by service firms, as well as by manufacturers who produce for international markets. Hospitals, restaurants, and government offices will have to become high-performance workplaces.

AMERICA 2000 speaks of a public-private partnership to "establish job-related... skill standards, built around core proficiencies." This document provides a first definition of the core proficiencies. As such, it defines the end point for high school work and the beginning point for further learning on the job or in a postsecondary institution. This Commission is defining a level of proficiency within a spectrum that extends back into middle and elementary school and forward to higher education. It is the seam in life-long learning between high school and further study.

LEVELS OF PROFICIENCY

In addition to defining the skills needed for employment, the Commission was asked to propose acceptable levels of proficiency; that is, to answer the question: What is the threshold level for each competency and foundation skill for entry-level work? How much know-how is enough for a typical job ladder? If these questions cannot be answered with precision, the SCANS task will not be accomplished.

Proposing levels of proficiency is a difficult assignment. It requires judgment and a leap of imagination into a future world where schools and work are restructured. What *could* students and workers learn if the educational system fully responded to the strategy contained in AMERICA 2000? What *would* be required to access a career ladder if the high-performance model shown in Figure A became the norm? The proficiency levels are what makes the definitions meaningful. The verb "reading" is almost meaningless until an object such as "a computer manual" is attached. Is the minimum level for entering a high-

performance workplace reading an instructional manual or a learned paper on advanced physics? Must an entry-level worker be able to listen to a customer with a complaint or to a lecture on advanced statistics?

SCANS proposes a proficiency scale that ranges from "preparatory" (suitable only for unskilled work) to "specialist" (suitable for jobs requiring special expertise). With proper preparation, all students could achieve at least the work-ready level on this scale. This level marks readiness to enter a job on a career ladder, one with real possibilities for decent pay and advancement in the workplace. In terms of just one area of competence—managing time as a resource—the proficiency scale might look like the following:

Proficiency Level	**Performance Benchmark**
Preparatory	Scheduling oneself
Work-ready	Scheduling small work team
Intermediate	Scheduling a production line or substantial construction project
Advanced	Developing roll-out schedule for new product or production plant
Specialist	Develop algorithm for scheduling airline

The following Figures F and G illustrate SCANS initial estimates of *work-ready* levels of proficiency required for entry into a career-ladder job today. These estimates may be modified as our research continues and as members of the public respond to this report; they are set forth to elicit reaction. Many people may believe these estimates are too high. They are certainly higher than most of us would expect today from all students. It would be surprising if most adults had these skills unless and until the competencies defined in this report are routinely taught in the schools. SCANS believes, however, that the competencies underlying the performances illustrated in these figures can be taught to, and learned by, every teenager.

Figures F and G describe the kinds of tasks performed by all employees in the high-performance workplace of today. These tasks define how the SCANS skills and competencies are used. Students who expect a promising career ladder must leave school with enough of this know-how to give employers some confidence that they can progress in the world of work.

Tomorrow's career ladders require even the basic skills to take on new meaning. As shown in the figures, future jobs will require employees who can **read** well enough to understand and interpret diagrams, directories, correspondence, manuals, records, charts, graphs, tables, and specifications. Without the ability to read a diverse set of materials, employees will not be able to locate the descriptive and quantitative information needed to make decisions or to recommend courses of action. On the job, for example, this may mean reading well enough to:

- interpret blueprints and catalogues to estimate material costs;
- deal with complaint letters and company policy manuals describing complaint policy;
- understand patients' medical records and instructions for administering medication; and
- read the text of technical manuals from equipment vendors.

FIGURE F

SERVICE KNOW-HOW: LEVEL OF COMPETENCE EXPECTED FOR ENTRY ON A CAREER LADDER

(See Accommodations and Personal Services Scenario, Chapter II)

COMPETENCE	EXAMPLE OF WORK-READY LEVEL
RESOURCES	Develop cost estimates and write proposals to justify the expense of replacing kitchen equipment. Develop a schedule for equipment delivery to avoid closing restaurant. Read construction blueprints and manufacturers' installation requirements to place and install equipment in the kitchen.
INTERPERSONAL	Participate in team-training and problem-solving session with multicultural staff of waiters and waitresses. Focus on an upcoming Saturday night when a local club has reserved the restaurant after midnight for a party. Three people cannot work and the team has to address the staffing problem and prepare for handling possible complaints about prices, food quality, or service.
INFORMATION	Learn how to use a spreadsheet program to estimate the food costs of alternative menus and daily specials. Make up weekly menu and print it with desk-top publishing software.
SYSTEMS	Analyze "system" that determines the average and maximum wait from the time customers sit down until they receive the appetizer and then the entree. Modify system to reduce both the average and maximum waiting time by 20 percent. Determine expected increase in the number of customers served.
TECHNOLOGY	Read the specifications and listen to salespeople describe three competing ovens for the kitchen. Write a report evaluating the ovens and making a recommendation. Set the automatic controls on the chosen oven to prepare a sample dish.

At the same time, most jobs will call for **writing skills** to prepare correspondence, instructions, charts, graphs, and proposals, in order to make requests, explain, illustrate, or convince. This may mean, for example:

- writing a memo to justify additional resources;
- preparing instructions for operating simple machines;
- developing a narrative to explain graphs and tables; and
- drafting suggested modifications in company procedures.

Mathematics and **computational skills** are also essential. Virtually all employees should be prepared to maintain records, estimate results, use spreadsheets, or apply statistical process

controls as they negotiate, identify trends, or suggest new courses of action. Mathematics skills are the foundation of such actions as:

- reconciling differences in inventory records;
- mentally estimating discounts while negotiating sales;
- using spreadsheet programs to track expenditures;
- using statistical process control procedures to maintain quality; and
- projecting resource needs over the next planning period.

Finally, very few of us will work by ourselves. More and more work involves listening carefully to clients and co-workers and clearly articulating one's point of view. Tomorrow's worker will have to **listen** and **speak** well enough to explain schedules and procedures, communicate with customers, work in teams, understand customer concerns, describe complex systems and procedures, probe for hidden meanings, teach others, and solve problems. On the job this might mean:

- explaining new production schedules to a work team;
- describing plans to supervisors and clients;
- questioning customers to diagnose malfunctions; and
- answering questions from customers about services offered.

Today, we cannot precisely determine how many youngsters have skills at the SCANS work-ready level. Our only data source is the 1986 National Assessment of Educational Progress (NAEP) survey of 21 to 25-year-olds. Our staff compared the tasks in Figures F and G with those assessed by the NAEP. On this basis we estimate that less than half of young adults can demonstrate the SCANS reading and writing minimums; even fewer can handle the mathematics. NAEP does not assess the competencies. But since they are rarely explicitly taught or assessed in school, it is likely that reading, writing, and mathematics performance represents the upper limits of student proficiency. Further, today most schools do not address the listening and speaking skills directly.

Figures F and G also illustrate that all three parts of the foundation are required in work settings and are part of the competencies. Meeting the challenges presented in both figures obviously requires basic skills. But higher order thinking skills are also needed. Proposing an effective menu requires creativity and mental visualization. Learning how to use a spreadsheet program—by definition—cannot be accomplished without knowing how to learn. Recommending equipment requires decision making. Developing a training plan that does not upset production schedules requires problem-solving and reasoning skills.

The same observation can be made for the personal qualities that are part of the foundation; these qualities are essential for performance. Irresponsible workers or those lacking self-esteem are unlikely to contribute in team problem-solving efforts. No firm wants discourteous employees without social skills dealing with vendors or salespeople, let alone with fellow employees or customers. Without the capacity for self-management, a worker cannot be given a lengthy assignment, such as analyzing statistical charts and finding ways to improve quality or analyzing the waiting time in a restaurant; those who are not self-starters will be looking for step-by-step

FIGURE G

MANUFACTURING KNOW HOW: LEVEL OF COMPETENCE EXPECTED FOR ENTRY ON A CAREER LADDER

(See Manufacturing Scenario, Chapter II)

COMPETENCE	EXAMPLE OF WORK-READY LEVEL
RESOURCES	Develop a plan to show how the production schedule can be maintained while the staff is trained in a new procedure. Estimate the number of additional employees or overtime required so that training can occur. Prepare charts to explain schedule to management and employees; make a presentation and answer questions about it.
INTERPERSONAL	Join a production team brainstorming to find ways to include two new workers who speak limited English in the plant's improvement program. The goal is to have all team members, whatever their English skills, make weekly suggestions to improve product quality.
INFORMATION	Analyze statistical control charts to monitor error rate. Develop, with other team members, a way to bring performance in your production line up to that of best practice in competing plants.
SYSTEMS	As part of information analysis above, analyze painting system and suggest how improvements can be made to minimize system downtime and improve paint finish.
TECHNOLOGY	Evaluate three new paint spray guns from the point of view of costs, health and safety, and speed. Vendors describe performance with charts and written specifications. Call vendors' representatives to clarify claims and seek the names of others using their equipment. Call and interview references before preparing a report on the spray guns and making a presentation to management.

instructions until it becomes easier for the manager to do the job him or herself. Finally, no firm can afford having workers whose integrity cannot be trusted involved in matters dealing with vendors or safety.

As the letter to parents, employers, and educators that preceded this document states: the real world does not "...categorize problems into five domains of competence and a three-part foundation. Instead, all eight [are applied] to the situation...." Figures F and G are intended to illustrate that idea.

FUTURE WORK

This report is the first product of the SCANS Commission. It defines the skills needed for

employment and contains our initial proposals for acceptable levels of proficiency.

As this report is in preparation, SCANS is continuing its analysis of performance requirements for 50 jobs, including chefs, electricians, bank tellers, truck drivers, and numeric control drill press operators.[4] When that analysis is complete, SCANS will be in a position to more accurately describe job performance requirements at the work-ready proficiency level for each of the five competencies.

The Commission's activities will conclude in February 1992. In the remaining months of the Commission's service, we will continue our efforts to propose acceptable levels of proficiency and turn our attention to the other two tasks with which we have been charged:

- suggesting effective ways to assess proficiency; and
- developing a dissemination strategy for the nation's schools, business, unions, and homes.

The work will be undertaken by a series of SCANS Committees that will address: Assessment, Changes in K-12 Education, Changes in Education for Today's Workers, and How Technology Can Support Educational Change. We also have created a special group to address the role of Government as Employer.

Assessment

President Bush has called for a nationwide voluntary assessment of our young people in grades 4, 8, and 12 in five core subjects: English, mathematics, science, history, and geography. We believe measurement of the SCANS competencies should inform the development of those assessments in grades 8 and 12. The President's program states, "Colleges will be urged to use the American Achievement Tests in admissions; employers will be urged to pay attention to them in hiring."

In the next six months, SCANS will consider the major issues involved in creating an assessment system for the competencies and the foundation.

SCANS understands that the large numbers of local, state, and nationwide examinations that are already administered in the nation's schools add up to a nearly overwhelming burden in the nation's classrooms. We have no desire to add to a testing system that is already extensive. At the same time, SCANS is convinced that most existing tests—largely pencil and paper, multiple-choice tests of short-term memory—do little to advance the cause of learning. Effective assessment techniques should support instruction and students' knowledge of their progress.

The assessment process we will examine further will be aimed at ensuring fairness for students from different social, racial, and economic backgrounds. The standards embodied in this assessment process should not be a barrier to student success but a gateway to a new future. This can be accomplished with an open assessment system in which the criteria for performance are crystal clear. Assessments must be designed so that, when teachers teach and students study, both are engaged in authentic practice of valued competencies. SCANS will not develop the assessment process; we will, however, consider and report on the issues involved.

[4]See Appendix D.

As part of that effort, SCANS will explore the idea of certifying that the competencies have been acquired.

SCANS aims to promote the development and use of assessments that can provide the basis for a new kind of high school credential. This credential will measure mastery of specific, learnable competencies. This approach is intended to renew the dignity of the high school diploma, giving it real meaning as a mark of competence.

Certifying the five competencies can serve several purposes not now being achieved. They will link school credentials, student effort, and student achievement; they will provide an incentive for students to study; and they will give employers a reason to pay attention to school records. Finally, they will provide a clear target for instruction and learning. Assessment can thus help improve achievement, not simply monitor it.

In response to President Bush's request that business and labor leaders help create "World Class Standards" of student performance, SCANS will work with the Departments of Labor and Education to "spearhead a public-private partnership" as called for in AMERICA 2000. This entity will advise education officials about work-relevant skills and knowledge as described in the President's education strategy.

The President has charged SCANS to inform the Secretaries of Labor and Education as they develop voluntary standards for all industries. We will review this charge under AMERICA 2000 before issuing our final report.

As the Secretary of Education has said, "AMERICA 2000 is not a program but a crusade." If that crusade is to succeed, education must effectively be linked to work. Employers and labor leaders, therefore, must participate in decisions about what future American schools will look like, what kinds of skills and knowledge they will teach, and what kinds of certificates of competence will accompany the high school diploma.

Dissemination

Developing a strategy to assure that the SCANS competencies become a part of the learning opportunity for every child in this nation is a formidable task. There are many issues to be considered if schools are to integrate instruction in these competencies into their current programs.

In the next six months, the Commission will consider the implications of the SCANS competencies and foundation for curriculum, instructional materials, school organization, and teacher training.

The members of SCANS understand that what they are proposing presents major new challenges to the nation's schools and educators. Schools of the future, capable of developing these competencies and skills in every student, will not spring up overnight. Creating schools of the future will require focusing on their organization and related concerns of curriculum, instructional materials, and teacher training.

We realize that these changes will not be free of charge. For example, the AMERICA 2000

Excellence in Education Act calls for Governors' Academies for School Leaders and for Teachers. We also realize that good schools will use their resources efficiently and effectively. In the remaining months left to SCANS, we will consider how educators might proceed.

Again, SCANS will not produce curricula or instructional materials. We will, however, examine the implications of our recommendations for these components of the learning process.

A BEGINNING

President Bush has encouraged all of us to be revolutionaries in the cause of education. The revolution required in education will not be easy to accomplish. But the members of the SCANS Commission remain optimistic. Many students and teachers are working wonders against great odds; many schools have begun the work of reshaping themselves. A review of our nation's history demonstrates that the success of the United States has always been rooted in the ability of its people to rise to new challenges. The knowledge that our education system is not keeping pace with change must be tempered with the recognition that these same schools produced men and women who have created changes undreamed of in the world.

For over 200 years Americans have worked to make education part of their national vision, indispensable to democracy and to individual freedom. For at least the last 40 years, we have worked to join the power of education to the ideal of equity—for minority Americans, for the disabled, and for immigrants. With that work still incomplete, we are called to still another revolution—to create an entire people trained to think and equipped with the know-how to make their knowledge productive.

This new revolution is no less exciting or challenging than these we have already completed. Nor is its outcome more certain. All that is certain is that we must begin.

To that end, SCANS contributes this document to the discussion. We do not pretend to have the final word. As a report on work in progress, our conclusions are tentative and incomplete. Nevertheless, we believe that what we have outlined here represents a genuine addition to the conversation. We offer it as a contribution to the national dialogue about education in America.

We ask all who care about that future to join us in this conversation. Is the vocabulary we have provided helpful? Are we on the right track with our definition of the know-how needed by young Americans? Are the competencies and skills we have defined being taught in your child's school or at your place of work? Your participation in this conversation can help refine, correct, and focus SCANS thinking as we continue our work. We invite you to be in touch with the Department of Labor for more information about these issues and for the tools and materials it can provide to help you test these ideas in your own community.

APPENDIX A
ACKNOWLEDGMENTS

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APPENDIX B
DEFINITIONS: THE COMPETENCIES

RESOURCES

Allocates Time. Selects relevant, goal-related activities, ranks them in order of importance, allocates time to activities, and understands, prepares, and follows schedules.

Allocates Money. Uses or prepares budgets, including making cost and revenue forecasts, keeps detailed records to track budget performance, and makes appropriate adjustments.

Allocates Material and Facility Resources. Acquires, stores, and distributes materials, supplies, parts, equipment, space, or final products in order to make the best use of them.

Allocates Human Resources. Assesses knowledge and skills and distributes work accordingly, evaluates performance, and provides feedback.

INTERPERSONAL

Participates as a Member of a Team. Works cooperatively with others and contributes to group with ideas, suggestions, and effort.

Teaches Others. Helps others learn.

Serves Clients/Customers. Works and communicates with clients and customers to satisfy their expectations.

Exercises Leadership. Communicates thoughts, feelings, and ideas to justify a position, encourages, persuades, convinces, or otherwise motivates an individual or groups, including responsibly challenging existing procedures, policies, or authority.

Negotiates. Works towards an agreement that may involve exchanging specific resources or resolving divergent interests.

Works with Cultural Diversity. Works well with men and women and with a variety of ethnic, social, or educational backgrounds.

INFORMATION

Acquires and Evaluates Information. Identifies need for data, obtains it from existing sources or creates it, and evaluates its relevance and accuracy.

Organizes and Maintains Information. Organizes, processes, and maintains written or computerized records and other forms of information in a systematic fashion.

Interprets and Communicates Information. Selects and analyzes information and communicates the results to others using oral, written, graphic, pictorial, or multi-media methods.

Uses Computers to Process Information. Employs computers to acquire, organize, analyze, and communicate information.

SYSTEMS

Understands Systems. Knows how social, organizational, and technological systems work and operates effectively within them.

Monitors and Corrects Performance. Distinguishes trends, predicts impact of actions on system operations, diagnoses deviations in the function of a system/organization, and takes necessary action to correct performance.

Improves and Designs Systems. Makes suggestions to modify existing systems to improve products or services, and develops new or alternative systems.

TECHNOLOGY

Selects Technology. Judges which set of procedures, tools, or machines, including computers and their programs, will produce the desired results.

Applies Technology to Task. Understands the overall intent and the proper procedures for setting up and operating machines, including computers and their programming systems.

Maintains and Troubleshoots Technology. Prevents, identifies, or solves problems in machines, computers, and other technologies.

APPENDIX C
DEFINITIONS: THE FOUNDATION

BASIC SKILLS

Reading. Locates, understands, and interprets written information in prose and documents—including manuals, graphs, and schedules—to perform tasks; learns from text by determining the main idea or essential message; identifies relevant details, facts, and specifications; infers or locates the meaning of unknown or technical vocabulary; and judges the accuracy, appropriateness, style, and plausibility of reports, proposals, or theories of other writers.

Writing. Communicates thoughts, ideas, information, and messages in writing; records information completely and accurately; composes and creates documents such as letters, directions, manuals, reports, proposals, graphs, flow charts; uses language, style, organization, and format appropriate to the subject matter, purpose, and audience. Includes supporting documentation and attends to level of detail; checks, edits, and revises for correct information, appropriate emphasis, form, grammar, spelling, and punctuation.

Arithmetic. Performs basic computations; uses basic numerical concepts such as whole numbers and percentages in practical situations; makes reasonable estimates of arithmetic results without a calculator; and uses tables, graphs, diagrams, and charts to obtain or convey quantitative information.

Mathematics. Approaches practical problems by choosing appropriately from a variety of mathematical techniques; uses quantitative data to construct logical explanations for real world situations; expresses mathematical ideas and concepts orally and in writing; and understands the role of chance in the occurrence and prediction of events.

Listening. Receives, attends to, interprets, and responds to verbal messages and other cues such as body language in ways that are appropriate to the purpose; for example, to comprehend; to learn; to critically evaluate; to appreciate; or to support the speaker.

Speaking. Organizes ideas and communicates oral messages appropriate to listeners and situations; participates in conversation, discussion, and group presentations; selects an appropriate medium for conveying a message; uses verbal language and other cues such as body language appropriate in style, tone, and level of complexity to the audience and the occasion; speaks clearly and communicates a message; understands and responds to listener feedback; and asks questions when needed.

THINKING SKILLS

Creative Thinking. Uses imagination freely, combines ideas or information in new ways, makes connections between seemingly unrelated ideas, and reshapes goals in ways that reveal new possibilities.

Decision Making. Specifies goals and constraints, generates alternatives, considers risks, and evaluates and chooses best alternatives.

Problem Solving. Recognizes that a problem exists (i.e., there is a discrepancy between what

is and what should or could be), identifies possible reasons for the discrepancy, and devises and implements a plan of action to resolve it. Evaluates and monitors progress, and revises plan as indicated by findings.

Seeing Things in the Mind's Eye. Organizes and processes symbols, pictures, graphs, objects or other information; for example, sees a building from a blueprint, a system's operation from schematics, the flow of work activities from narrative descriptions, or the taste of food from reading a recipe.

Knowing How to Learn. Recognizes and can use learning techniques to apply and adapt new knowledge and skills in both familiar and changing situations. Involves being aware of learning tools such as personal learning styles (visual, aural, etc.), formal learning strategies (notetaking or clustering items that share some characteristics), and informal learning strategies (awareness of unidentified false assumptions that may lead to faulty conclusions).

Reasoning. Discovers a rule or principle underlying the relationship between two or more objects and applies it in solving a problem. For example, uses logic to draw conclusions from available information, extracts rules or principles from a set of objects or written text; applies rules and principles to a new situation, or determines which conclusions are correct when given a set of facts and a set of conclusions.

PERSONAL QUALITIES

Responsibility. Exerts a high level of effort and perseverance towards goal attainment. Works hard to become excellent at doing tasks by setting high standards, paying attention to details, working well, and displaying a high level of concentration even when assigned an unpleasant task. Displays high standards of attendance, punctuality, enthusiasm, vitality, and optimism in approaching and completing tasks.

Self-Esteem. Believes in own self-worth and maintains a positive view of self; demonstrates knowledge of own skills and abilities; is aware of impact on others; and knows own emotional capacity and needs and how to address them.

Sociability. Demonstrates understanding, friendliness, adaptability, empathy, and politeness in new and on-going group settings. Asserts self in familiar and unfamiliar social situations; relates well to others; responds appropriately as the situation requires; and takes an interest in what others say and do.

Self-Management. Assesses own knowledge, skills, and abilities accurately; sets well-defined and realistic personal goals; monitors progress toward goal attainment and motivates self through goal achievement; exhibits self-control and responds to feedback unemotionally and non-defensively; is a "self-starter."

Integrity/Honesty. Can be trusted. Recognizes when faced with making a decision or exhibiting behavior that may break with commonly-held personal or societal values; understands the impact of violating these beliefs and codes on an organization, self, and others; and chooses an ethical course of action.

APPENDIX D
JOBS ANALYSIS

The SCANS concepts of competencies and a foundation, and the use of scenarios describing work in context, was developed by the Commission and staff based on a review of the literature and advice from numerous experts. Convinced that this new language represented a promising start, SCANS extended this conversation into the research and business communities. We wanted to ensure that the five competencies and the foundation were, in fact, critical to job performance. We also worked to ensure that the workplace scenarios represented expert reflection on what today's worker actually does.

During Phase I of this effort 15 jobs have been analyzed through detailed, in-depth interviews, lasting up to four hours each, with job holders or their supervisors. The interviews explored the general job description, confirmed ratings of the importance of skills, and inquired about "critical incidents" and illustrative tasks and tools used on the job.

The 15 jobs, by employment sector, are:

- **Restaurant and Accommodations**
  - —Chefs
  - —Front Desk Clerks
  - —Assistant Housekeepers
- **Manufacturing and Construction**
  - —Electricians
  - —Numeric Control Drill Operators
  - —Offset Lithographer Press Operators
- **Office and Finance**
  - —Bank Tellers
  - —Underwriter Assistants
  - —Secretaries
- **Health and Human Services**
  - —Medical Record Technicians
  - —Registered Nurses
  - —Teacher's Aides
- **Trade and Communications**
  - —Truck Drivers
  - —Retail Salespeople
  - —Inside Equipment Technicians.

In Phase 2 of the SCANS research, the following 35 jobs will be added to the research base:

- **Manufacturing, Agri-Business, Mining, and Construction**
  - —Plastic Molding Machine Operator
  - —Blue Collar Worker Supervisor
  - —Farmer
  - —Excavating Machine Operator
  - —Carpenter
  - —Expeditor/Purchasing Agent
  - —Construction Contractor
- **Health and Human Services**
  - —Childcare Aide
  - —Dental Hygienist
  - —Dietary Manager
  - —Licensed Practical Nurse
  - —Medical Assistant
  - —Medical Technician/Technologist
  - —Optician
- **Office, Financial Services, and Government**
  - —Graphics Designer
  - —Computer Operator
  - —Accounting/Financial Analyst

- —Programming Technician
- —Personnel Specialist
- —Law Enforcement Officer
- —Quality Control Inspector

- **Accommodations and Personal Services**
  - —Food Service Unit Manager
  - —Waiter/Waitress
  - —Industry Training Specialist
  - —Account Executive/Executive Meeting Manager
  - —Hairstylist/Cosmetologist/ Esthetician
  - —Beauty Shop Owner
  - —Show Operations Supervisor

- **Trade, Transportation, and Communications**
  - —Order Filler
  - —Traffic, Shipping and Receiving Clerk
  - —Outside Equipment Technician
  - —Truck Delivery Salesperson
  - —Telemarketing Representative
  - —Travel Agent
  - —Customer Service Representative

FOR ADDITIONAL INFORMATION AND MATERIALS, CONTACT:

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